Service Service Service

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Technical Specifications, Connections, and Chassis Overview

Technical Specifications

Channel selections

125 channels

Aerial input

Full cable, UVSH 75 Ohm, IEC-type

1.1.1 Reception

> Tuning system Colour systems

A/V connections

: PLL

: PAL B/G, D/K, I

: SECAM B/G, D/K

L/L1

Sound systems : FM/AM-mono

: FM/FM B/G, Czech : NICAM B/G, D/K, I, L

: PAL B/G, D/K, I : SECAM B/G, D/K,

L/L1

: NTSC 4.43 (playback

only)

1.1.2 Miscellaneous

> Mains voltage Mains frequency

Ambient temperature Maximum humidity

: 50 - 60 Hz : +5 to +45 deg. C

: 95 - 264 Vac

: 90% R.H. Power ON dissipation : 28 W typical Power OFF dissipation 0.2 W typical : 0.6 W Typical Standby Power dissipation

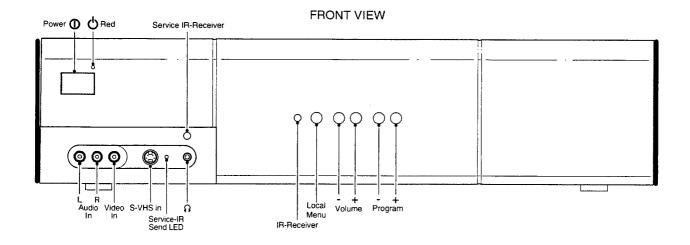
Weight

: 4 kg

Dimensions (WxHxD) : 435 x 100 x 330 mm

Connections 1.2

1.2.1 **Front Connections**



REAR VIEW

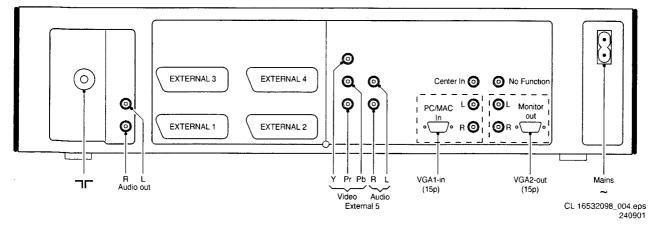
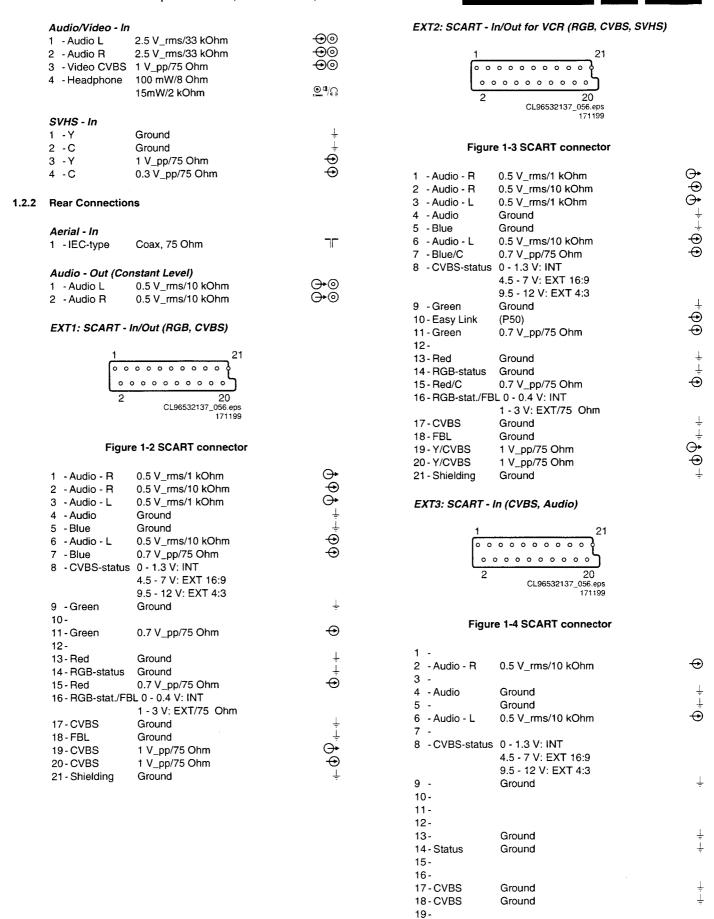


Figure 1-1 Front and rear connections



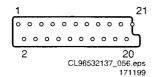
20-CVBS

21 - Shielding

1 V_pp/75 Ohm

Ground

EXT4: SCART- In (CVBS, Audio)



F21RE AB

Figure 1-5 SCART connector

1 -		
	0.5 V_rms/10 kOhm	⊕
3 -		
4 - Audio	Ground	+
5 -	Ground	- (- (-
6 - Audio - L 7 -	0.5 V_rms/10 kOhm	-
8 - CVBS-status	0 - 1.3 V: INT	
	4.5 - 7 V: EXT 16:9	
	9.5 - 12 V: EXT 4:3	
9 -	Ground	‡
10-		
11-		
12-		
13-	Ground	Ť
14 - Status	Ground	Ť
15-		
16-		
17-CVBS	Ground	Ţ
18-CVBS	Ground	-
19-		
20-CVBS	1 V_pp/75 Ohm	⊕
21 - Shielding	Ground	1
EXT5: SD - In (Y	PbPr, Audio)	
Y	1 V_pp/75 Ohm	⊕⊚
D.,	071//7506	-

PC/MAC - In (Sub-D: RGB+H/V)

- - Pr

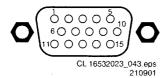
- Pb

2 - Audio L

3 - Audio R

- Audio - L

- Audio - R



0.7 V_pp/75 Ohm

0.7 V_pp/75 Ohm

0.5 V_rms/1 kOhm

0.5 V_rms/1 kOhm

Figure 1-6 VGA connector

1 - Red 2 - Green 3 - Blue	0.7 V_pp/75 Ohm 0.7 V_pp/75 Ohm 0.7 V_pp/75 Ohm	⊕ ⊕ ⊕
4 - Data 2	n.c.	4
5 -Test	Ground	÷
6 - Red	Ground	Ť
7 - Green	Ground	‡ ‡ ‡
8 - Blue	Ground	Ţ
9 - n.c.		
10-	Ground	Ţ
11 - Data 0	n.c.	
12 - Data 1	n.c.	
13-H-sync	0 - 5 V/1 kOhm	⊕
14 - V-sync	0 - 5 V/1 kOhm	⊕
15-Data 3	n.c.	
Audio PC/MA	C - In (Cinch: VGA1, Centre)	
1 - Centre	0.5 V_rms/10 kOhm	⊕⊚

0.5 V_rms/10 kOhm

0.5 V_rms/10 kOhm

Audio Monitor - Out (Cinch: VGA2, RC-in) **⊕**⊚ 5 V 1 -RC-in 2 - Audio L 0.5 V_rms/10 kOhm ⊕•⊚ 0.5 V_rms/10 kOhm 3 - Audio R

Monitor - Out (Sub-D: RGB+H/V, UART)

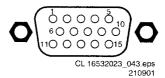


Figure 1-7 VGA connector

1 - Red	0.7 V_pp/75 Ohm	→
2 - Green	0.7 V_pp/75 Ohm	\rightarrow
3 - Blue	0.7 V_pp/75 Ohm	\rightarrow
4 - Data 2	n.c.	
5 - Test	Ground	Ť
6 - Red	Ground	_
7 - Green	Ground	Ť
8 -Blue	Ground	1
9 -RC		⊕
10-	Ground	Ť
11 - Data 0	CONFIG_IDENT	→
12 - Data 1	UART - TXD	\rightarrow
13 - H-sync		\rightarrow
14 - V-sync		\rightarrow
15 - Data 3	UART - RXD	\rightarrow

1.3 **Chassis Overview**

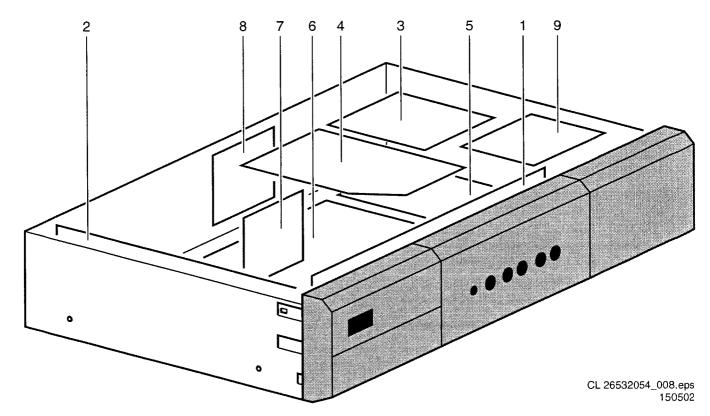


Figure 1-8 Panel position

- 1. Front I/O Panel (FP).
- 2. Power Supply Panel (PS).
- 3. Double Window Panel (if present).
- 4. Feature Box (FBX).
- 5. Small Signal Panel (SSP).
- 6. Audio Video Interface Panel (AVI).
- 7. Scaler Panel (if present).
- 8. Standard Definition Connector Panel (SD).
- 9. 3D Comb Panel (C)

EN 6

2.

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Safety Instructions, Warnings, and Notes

2.1 Safety Instructions

Safety regulations require that during a repair:

- Connect the Receiver box to the mains via an isolation transformer
- When you use the Receiver box in combination with a plasma monitor, do not operate the monitor without the front glass plate. One function of this glass plate is to absorb IR radiation. Without this glass plate, the level of radiation could damage your eyes.
- Safety components, indicated by the symbol A, must be replaced with original components.

Safety regulations require that **after** a repair, you must return the set in its original condition. Pay particular attention to the following points:

- Route the wire trees in their original positions and fix them in place with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side (only for sets which have an mains isolated power supply):
 - Unplug the mains cord and connect a wire between the two pins of the mains plug;
 - Set the mains switch to the "on" position (keep the mains cord unplugged!).
 - Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MOhm and 12 MOhm.
 - Set the mains switch to the "off" position, and remove the wire between the two pins of the mains plug.
- Check the cabinet for defects, to prevent the customer from touching any inner parts of the television set.

2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD symbol ...). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same electrical potential as the set by a wristband with resistance. Keep components and tools at this same potential. Available ESD protection equipment:
 - Complete ESD3 kit (small tablemat, wristband, connection box, extension cable and earth cable): 4822 310 10671.
 - Wristband tester: 4822 344 13999.
- Be careful while taking measurements in the live voltage section.
- Never replace modules, or other components, with the television set "ON."
- Use plastic tools, instead of metal tools, when performing alignments on the television set. This will help prevent short circuits and reduce the danger of a circuit becoming unstable.

2.3 Notes

2.3.1 General

- Measure the direct voltages and oscillograms with regard to the chassis ground (symbol ¹/_√), or hot ground (symbol ¹√√).
- The direct voltages and oscillograms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and

- stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 61.25 MHz (NTSC).
- Where necessary, measure the oscillograms and direct voltages with (symbol ¬□) and without (symbol ¬□) aerial signal. Measure the voltages in the power supply section both in normal operation (symbol ⊕) and in standby (symbol ⊕). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kOhm).
- Resistor values with no multiplier may be indicated with either an 'E' or an 'R' (e.g. 220E or 220R indicates 220 Ohm).
- All Capacitor values are expressed in Micro-Farads (μ = x10⁻⁶), Nano-Farads (n = x10⁻⁹), or Pico-Farads (p = x10⁻¹²).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An 'asterisk' (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

2.3.3 Practical Service Precautions

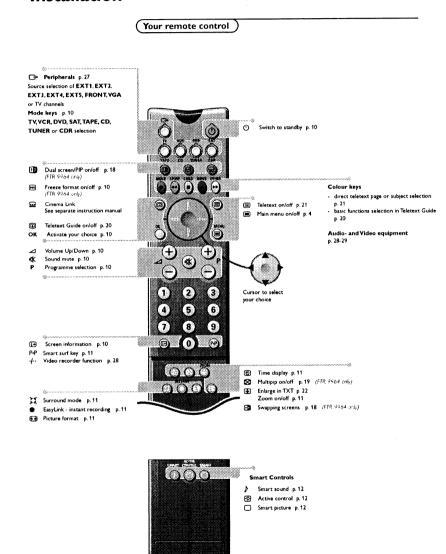
- It makes sense to avoid exposure to electrical shock.
 While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- Always respect voltages. While some may not be dangerous in themselves, they can cause unexpected reactions - reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.
- Before powering up the TV set with the rear cover off
 (or on a test fixture), attach a clip lead to the CRT DAG
 ground and to a screwdriver blade that has a well insulated
 handle. After the TV is powered on and high voltage has
 developed, probe the anode lead with the blade, starting at
 the case of the High Voltage Transformer (flyback IFT).
 Move the blade to within two inches of the connector of the
 CRT.

If there is an arc, you found it the easy way, without getting a shock!

If there is an arc to the screwdriver blade, replace the part that is causing the problem: the High Voltage Transformer or the lead (if it is removable).

_}⊸ **⊱**3

Installation



Preparation

- Place the receiver box wherever you want, but make sure that air can circulate freely through the ventilation slots. Do not install the receiver box in a confined space such as a book case or a similar unit.
 - To prevent any unsafe situations, no naked flame sources, such as lighted candles, should be placed on or in the vicinity. Avoid heat, direct sunlight and exposure to rain or water.
 - The equipment shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on it.
- Connect the supplied aerial cable ① and the VGA cable with trailing audio cinch connectors ② as shown in the inside frontcover of this handbook. Make sure all screws of the cable ② are tightened well.

TV receiver box with speakerless monitor

In case you connect your TV receiver box with a speakerless monitor, and without having connected an audio receiver all references made in this instruction book to sound reproduction, volume control, and audio connections, are not applicable (except for a headphone connection). The keys on the remote control referring to sound have no function either.

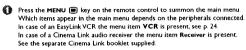
- To connect your computer, see the separate supplied instruction manual with your monitor.
 - To connect other peripherals, see p. 24.

 If you dispose of a Cinema Link combination (Cinema Link Audio receiver and/or Cinema Link video recorder and/or DVD player), see the separate supplied instruction manual.
 - In order to obtain the best result, please use only the supplied antenna cables between the receiver box and videorecorder, and between videorecorder and antenna connector.
- Insert the mains cord supplied ③ into the MAINS at the back of the monitor and the mains cord ④ at the back of the receiver. Put both in the wall sockets.
- Remote control. Remove the cover of the battery compartment. Insert the 2 batteries supplied (Type R6AA-1.5V).
 - Press the TV key to be sure your remote control is in the TV mode. The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries batteries may not be disposed of with your household waste. Please check on how to dispose of batteries according to local resolutions.
- Switch the TV on: Press the power key (1) at the right side of the monitor and the one on the front of the receiver box.
 - A green indicator lights up both on the monitor and on the receiver box and the screen comes on.
 - If the indicator is red, press the P+ key or one of the digit keys on the remote control.

The green indicator blinks every time you press a key on the remite control. When you switch on your set for the first time, the menu LANGUAGE automatically appears on the screen. The explanation appears in different languages one at a time. Follow the instructions on screen.



Attention: point the remote control to the indicator of the monitor.



Note: The Main menu contains the Item Exit to dismiss the Interior only when you switch on your TV for the first time, or when the Main menu is summeried with the MENU key in final of the TV reselver.

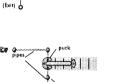
OK key to activate Use the cursor in the up/down direction to select the TV, (DVD), (VCR), (Receiver), Setup or Install menu.

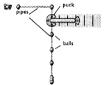
Note: Sometimes not all the menu items are visible on the screen. Press the cursor down to reveal all items.

Use the cursor in the left/right direction to select the menu item.

Use the cursor up/down again to select the control you want to select or to adjust. For instance, see Picture menu.

Press the MENU (a) key again to turn off the main menu





åöåö

9 G O

000000

TV (

(DVD) (

(VCR)

Setup d

Install 6

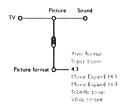
(Receiver)

switch main menu

cursor to select

adjustments

on/off



The menu system

Pipes, balls and a puck

The hierarchy of menus and controls is represented by an animated visual mechanism of pipes, balls and a puck. The animated mechanism constantly shows the current whereabouts and continually expands the view of the immediate neighbourhood.

The puck surrounds the ball indicating the user's current position in the menu hierarchy.

The puck is always present when the menu system is displayed. The puck is divided into 4 parts. They correspond to the directional controls (up/down, left/right) on the remote control. The arrows on the cursor indicate which directions to choose.

In this way users can navigate through the menu hierarchy to the control they wish to adjust.

When items are more numerous than can fit comfortably on the TV display, only a portion are shown. Those omitted are indicated by a cluster of balls which indicates that there are 'more' items.

Direct selection and control

Menu items are controlled as soon as they are selected by the puck. Only a few items require confirmation with the **OK** key.

List controls

A list control is used to select one or more items from a list of options. For instance, the Picture format option list with 43, Movie Expand 14.9, etc. Press the right key to move the puck into the list. At least one item is the current value and is highlighted.

Moving the puck up or down with the up/down key causes the list to move down or up.

Preparation 3

Select the menu language Press the MENU (key on the remote control. When you switch on your TV for the first time and no channels are stored so for the menu Language automatically appears on the screen. This menu also has an additional item Exit with which the menu can be dismissed. The explanation appears in different languages, one at a time. Choose your 00000 preferred language and press the OK key on the remote control. Proceed return or switch with the lostall meau. main menu on/off Use the cursor down to select Install. cursor to select Use the cursor right to select Language. adjustments Follow the instructions on screen. **OK** key to activate Use the cursor up/down to select your preferred language and press the OK key to confirm your selection. Language Proceed with the Install menu. English Deutsch Français Select the country Use the cursor right to select Country. Country Install O Select the country where you are now located and press the OK key. Select Other when none of the countries applies. Proceed with the Install menu. Store TV channels You can now search for and store the TV channels in two different ways: using Automatic Installation or Manual Installation (tuning-in Automatic installation channel by channel).

of the TV.

Automatic installation

Install 0-0 Start

- Select Automatic installation in the Install menu. Note: All channels must be unlocked in order to autobrogram. If requested, enter your code to unlock all channels. (See TV. Features menu, Childlock, p. 16.)
- Press the cursor down. The autoprogramming option label Start appears.
- Press the cursor right.
- The message Searching appears and the progress of autoprogramming is displayed. When the Automatic installation is complete, the puck navigates to Install again.

If a cable system or a TV channel which broadcasts ACI (Automatic Channel Installation) is detected, the search is stopped and the programme list appears.

After the new or extra TV channels have been stored, the TV automatically

transfers those TV channels to the video recorder if it is equipped with the

EasyLink function. The message EasyLink: downloading appears on the

screen. The programme list of the video recorder is now the same as the one

Select your choice with the cursor right.

Without ACI broadcast, the channels are numbered according your language and country selection. You can use Reshuffle to renumber them. See p. 6.

It is possible that the cable company or the TV channel displays a broadcast selection menu. Layout and items are defined by the cable company or the TV channel. Make your choice with the cursor and press the OK key

Manual installation

Manual installation Selection mode System Programme Fine tune

Searching for and storing TV channels is done channel by channel. You must go through every step of the Manual Installation menu.

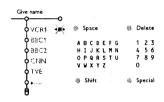
Select Manual Installation in the Install menu.

Press the cursor down. Follow the instructions on screen.

> Note: Search or direct selection of a TV channel If you know the frequency, the C- or S-channel number, enter the 3 digits of the frequency directly with the digit keys 0 to 9 (e.g. 048). Press the cursor down

Repeat to search for another TV channel

Give name



It is possible to change the name stored in the memory or to assign a name to a TV channel for which a name has not yet been entered. A name with up to 5 letters or numbers can be given to the programme numbers 0 to 99. For example SUPER. BBC1... Before programme number 0 you can also enter a name for the peripherals that are connected to a euroconnector

Note: it is not possible to rename the VGA source.

- Select Give Name in the Install menu and press the cursor
- Select the programme number. Note: keep the cursor up/down pressed to scroil through the programme list and to avoid that the TV tunes to each channel passed by
- Press the cursor right. A keyboard appears on the screen. Press the cursor right to enter the keyboard. Press the cursor up/down, left/right to select the first character and press OK. Repeat for every character you want to enter Select Space to enter a space; Delete to erase the highlighted character in the name entered; Shift to display

display special characters on the keyboard. Press OK to Press the cursor left repeatedly when you have finished the

upper- or undercast characters on the keyboard; Special to

name giving of the selected channel or peripheral.

Select another programme number and repeat steps
to ...

Reshuffle the programme list

According to your preference you can change the order of the stored TV channels.

- Select Reshuffle in the INSTALLATION menu.
- Follow the instructions on screen.

Select Favourite TV channels

A VGA source always belongs to the list of Favourite programmes.

- Select Favourite programmes in the Install menu.
- Select your programme number with the cursor up/down.
- Select Yes or No with the cursor right.
- Repeat and for every TV channel or external you want to make a favourite or a non-favourite TV channel or external.

Installation 5

Installation

Select TV setup

The Setup menu allows you to adjust initial settings, i.e. those which are not related to the installation of the TV channels.

The Setup menu contains items that control the settings of the TV's functions, features, services and peripherals you may have connected.

General

This menu allows you to change various settings that are presumably adjusted less frequently than most other settings.

Menu Background

- Select Menu Background with the cursor down.
- Press the cursor right.
- Select On or Off to turn the Menu Background on or off.

Smart sur

- Select Smart surf with the cursor down.
- Select 2 programmes or 9 programmes with the cursor right.

Select 2 programmes if you want the P4P key to toggle between the current and the previously selected channel. Select 9 programmes if you want the P4P key to summon a list of up to 9 channels which can be selected. (See Use of the Remote Control, p. 11.)

Dual screen format (FTR 9964 only)

This menu allows you to select the preferred format which can then be displayed toggling the 🔞 key on and off.

See Dual screen/PIP, p. 18.

Select Dual screen, Large PIP, Medium PIP or Small PIP with the cursor down.

When Dual screen mode is activated with the remote control (1) key, and when:

- Dual screen is selected, the TV splits the screen into two equally sized screens.
- PIP is selected, the TV shows a full screen of video with a pip window of video on top if it.

Multipip format (FTR 9964 only)

This menu allows you to select the preferred format which can then be displayed toggling the Can key on and off.

Select PIP3 PIP8 or PIP12 with the cursor down

See Multipip, p. 19 how to operate.

Freeze format (FTR 9964 only)

This function is not possible with a VGA source.

Freeze format allows you to select among three options: Freeze, Replay, Photo finish, to be activated when you press the \bowtie key on the remote control. See p. 10.

Note: Continuing to hold the 😝 key down will also cycle the TV through the various formats. Changing the format this way does not store the selected format.

Installation

Factory settings

This function allows you to reset most of the picture and sound settings to their predefined factory values.

- Select Factory settings with the cursor down.
- Press OK to erase settings and reset them to their default values.

OSD (On Screen Display)

- Select OSD with the cursor down.
- Press the cursor right to select Normal or Minimum.

 Normal to activate extended display of TV channel and programme information on screen.

 Minimum to activate the display of reduced channel information.

See Use of the Remote Control, p. 10, (1) On screen information.

Note: When Subtitles is switched on see Features, p. 16, display of the programme number is not possible.

Programme title

OSD ONormal / Minimum

General

- Select Programme title with the cursor down.
- Press the cursor right to select Programme title Yes or No.

 When selected Yes, after the selection of a TV programme or after pressing the 13 key on the remote control, a TV channel which broadcasts teletext may transmit the name of the TV channel or the programme title.

 When selected No, the programme title will only appear after pressing the 13 key, and not after the selection of a TV channel.

Set/Change code

The Child lock feature (see TV. Features, p. 16) allows you to lock channels to prevent children from watching certain programmes.

To watch locked channels, you need to enter an access code.

The Set/Change code menu item allows you to create or change a Personal Identification Number (PIN).

- Select Set/Change code with the cursor down.
- If no code exists yet, the menu item is set to Set code. Follow the instructions on screen.

If a code has previously been entered, the menu item is set to Change code. Follow the instructions on screen.

All number combinations from 0000 to 9999 are valid numbers.

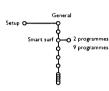
The General menu reappears with a message confirming that the code has been created.

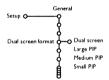
Important: You have forgotten your code!

- Select Set/Change code in the General menu.
- Press OK.
- Press the cursor right.
- Enter the overriding code 8-8-8-8.
- Press the cursor again and enter a new personal 4-digit code.

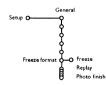
 The previous code is erased and the new code is stored.











Installation 7





Teletext level 2.5

Some broadcasters offer the opportunity to see more colours, other background colours and nicer pictures in the teletext pages.

- Select Teletext level 2.5 with the cursor down.
- Press the cursor right to select Teletext level 2.5 On to take advantage of this feature.
- Press the cursor right again to select Teletext level 2.5 Off if you like the more neutral teletext layout.

The selection made is valid for all channels which broadcast teletext.

Note: It may take a few seconds before teletext broadcast switches over to Teletext level 2.5

Centre mode

When you have connected a multi channel audio receiver to the receiver box (see Connect peripheral equipment, p. 26) and you have selected Centre mode On, the loudspeakers of the monitor will act as centre speaker, making a separate centre speaker unnecessary.

Source

This menu allows you to select the peripheral you connected to one of the external inputs

- Select Source with the cursor right.
- Press the cursor down to select one of the external inputs.
- Press the cursor right to enter the list of types of peripherals attached to the
- Select the peripheral device with the cursor up/down.

Once you have selected the source, e.g. VCR. this source will automatically be selected when your remote control is in VCR mode, see p. 10, and you press the 174 key on the remote control.

Decoder

If a decoder or a descrambler is connected, see p. 24, you can define one or more programme numbers as decoder programme numbers.

- Select Decoder with the cursor right.
- Select Programme with the cursor down.
- Select the programme number under which you have stored the programme coming from your decoder.
- Select State
 - Select the input used to connect your decoder: None. EXT1. EXT2.
 - Select None if you do not want the selected programme number being activated as a decoder programme number.

Operation

Use of the remote control

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2 3

Select your computer or other peripherals

Press this key repeatedly to select EXT1. EXT2, EXT3, EXT4. EXT5,
FRONT, VGA or TV channels, according to where you connected

your peripherals (see p. 27).

Remark in VGA mode only some keys are valid. See VGA menu, p. 27.

Menus and on screen information will disappear if you select VGA.

TV VCR DVD SATTAPE CD TUNER CDR

Press one of these keys to use the remote control directly in the TV, video recorder, DVD or satellite mode. A green indicator lights up. Press the same key again within 3 seconds to use the remote control in the mode indicated below the key (tape, CD, tuner or CD-recordable). A red indicator lights up.

Press the key again within 3 seconds to return to the function named above the key.

Teletext Guide on/off see p. 20

OK Press this key to activate your choice, when in the menus.

✓ Volume ress + or - to adjus

Press + or - to adjust the volume.

IX Sound Mute

Temporarily interrupt the sound or restore it.

P Programme selection

To browse through the TV channels and sources stored.

Only those channels which are in the favourite list can be selected with the -P+ keys. See p.6.

0/9 Digit keys

To select a TV channel.

For a two digit channel number, enter the second digit within 2 seconds.

To switch immediately to a selected one digit

TV channel, keep the digit key pressed a bit longer.

i+ Screen information

Press to display information about the selected TV channel and programme.

(I) Standby

The set is switched off and the red indicator lights up.

To switch the TV on again, press - P + or the digit keys.

If your EasyLink video recorder has the system standby function and you press the standby key for 3 seconds, both the TV and video recorder are switched to standby.

D Dual screen/PIP on/off (FTR 9964 only) See Setup, General menu, p. 7, and Dual screen/PIP, p. 18.

№ Freeze

Press the key to activate/de-activate a

Freeze format on/off (FTR 9964 only)
This function is not available with a VGA source.

See Setup menu, General, Freeze format, p. 8 where you can select among three modes to be displayed when the freeze key is pressed on the remote control: Freeze,

Replay. Photo finish.

When the mode is Freeze: press the Mey to activate/de-activate a frozen picture. The

audio continues to play
When the mode is Replay: press the ∰ key
to redisplay a few seconds of stored video in
a PIP window. Press the OK key to display a
few seconds of a new stored video picture.
Press the ∰ key again to switch off.
When the mode is Photo finish: press the
∰ key to display 12 PIP windows of stored
video pictures. Press the OK key to display a
new series of frozen pictures. Press the ∰

key again to switch off.
Note: Continuing to hold the Me key down will cycle the TV through the vanous modes (Freeze, Replay, Photo Finish).

G Cinema Go

See separate Cinema Link instruction manual supplied.

Teletext on/off see p. 21

Main menu on/off see p. 4

Surround mode on/off

- In MONO sound mode, this feature, when switched on, enables you to hear a special effect of sound.
- In STEREO sound mode, when Surround mode is switched on, it seems as though the loudspeakers are spread further apart from one another.

Instant record

If your video recorder has the EasyLink function, the INSTANT • key for record can be operated in the TV mode.

Fig Picture format

Press this key to summon a list of available picture formats.

Press this key repeatedly or press the cursor up/down to select another picture format: Auto format. Super zoom, 4:3, Movie Expand 14:9, Movie Expand 16:9, Subtitle zoom, Wide screen

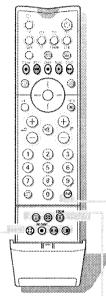
Auto format makes the picture fill the screen as much as possible.

In case of subtitles in the bottom black bar, Auto format makes the subtitles visible. In case of a broadcaster logo in the corner of the top black bar, the logo disappears from the screen.

Super zoom removes the black bars on the sides of 4.3 programs with minimal distortion. When in Movie Expand 14.9, 16.9 or Super zoom picture format, you can make subtitles visible with the cursor up/down.

Swapping screens in Dual screen

See Setup, General menu, p. 8 and Dual screen/PIP, p. 18.



PP Smart surf

With this feature you can easily switch between different TV channels/sources that currently interest you.

In the menu system, you can set Smart surf to 2- or 9-programme. (Smart surf. p. 7.) Press this key to select the previously viewed

TV channel or source in case of a 2 programme surf, or to select the surf ring in case of a 9 programme surf. In case of a 9 programme surf. In case of a 9 programme surf, a list appears at the right side of the screen. On top, the most recently added. The puck is on the channel number currently viewed.

Fress the P4P key to turn to the next channel in the list or press cursor up/down to immediately select the desired TV channel of the list.

To add a new channel or source: tune to the channel or source you wish to add.

Press the P4P key. Press the cursor right to add.

If there are already nine channels/sources in the list, the one at the bottom of the list will be removed.

To remove a channel or source: select the channel number you want to remove. Press the P4P key. Press the cursor right to remove.

Press the **OK** key or wait for the time out to dismiss the Smart surf display.

Time display on/off

The time is displayed on the screen.

Multipip (FTR 9964 only)

Press 💽 to turn on/off Multipip.

The Multipip format that launches on the key press is determined by the selection you made in the Multipip format list in the General menu, see Setup. General, p. 8 and Multipip format, p. 19.

Note: Continuing to hold the Stey down will cycle the TV through the various formats (PIP3, PIP8, PIP12), bunching a new format offer each second the key is held down. Changing the format this way does not store the selected format.

Press the Stey again to return to a full main screen picture.

₹ ZOOM on/off

Press the ZOOM \(\overline{\overline

The zoom window is reset after: selecting another TV channel, another picture format or when another picture format is selected automatically. Zooming is disabled in Dual screen and VGA mode.

Use of the remote control 11

Active Control

Active Control is a pro-active and automatic system. The TV continuously measures and corrects all incoming signals in order to provide the best picture possible According to the monitor connected (with or without an Ambient Light Sensor which measures the light conditions of the room), the Active Control functionality may differ. With a monitor without a light sensor: Press the R key to select the the Active Control values Off or On. With a monitor with a light sensor: Press the key repeatedly to select the Active Control values Off. Minimum Medium or Maximum (recommended) Minimum/On Sharpness, Dynamic Contrast and Noise Reduction are

controlled automatically **Medium** Sharpness, Colour, Dynamic

Contrast and Noise Reduction are

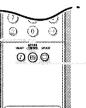
controlled automatically

aximum Sharpness, Colour, Contrast,
Dynamic Contrast and Noise
Reduction are controlled automatically

Press the cursor in the right direction to select INFO.

The Active Control Demo appears.
The picture settings are being adapted continuously and automatically.
The sliders will be moving, showing how the TV is tweaking the current picture.
None of the sliders is user controllable.
Press the **OK** key to switch off the Demo.

Press the **OK** key to switch off the Demo.
Note: Active Control is not available for digital HD signals.



Smart keys

To select predefined picture and sound settings.

Note: The Smart keys are disabled when a VGA source is being displayed.

♪ Sound

Each time it is pressed, a different sound setting is selected, corresponding with specific factory setting of bass and treble.

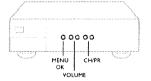
Picture

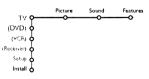
Each time it is pressed, a different picture setting is selected, corresponding with specific factory settings of Contrast, Colour, Sharpness, Colour Enhancement, DNR and Dynamic Contrast.

Personal refers to the personal preference settings of picture and sound selected in the picture and sound menu.

Remarks the mament you are in a predefined smart sound or picture setting and you modify a setting in the picture or sound menu, all volves of the menu will orenwite the previously mode Personal settings. The predefined factory settings remain unchanged.

Keys in front of the TV receiver box





Should your remote be lost or broken you can still use the keys in front of the TV receiver box.

- Press the VOLUME or + key to adjust the chosen volume.
- Press the CH/PR and + key to browse through the TV channels or sources stored and to select them.
- Press the MENU key to summon the main menu.
 Use the VOLUME and + keys to select the menu item.
 Use the CH/PR and + keys to select the TV. (DVD), (YCR), (Receiver),
 Setup, Install menu or Exit or to select the submenu items.

Mote:

- Sometimes not all the menu items are visible on the screen;
- Press the CHIPR + key to reveal all items.
- The **Exit** menu lets you dismiss the menu. Select **Exit** and press the **MENU** key.

Use of the remote control



Picture Contrast (Brightness Colour Sharpness C Dig. natural motion (Dynamic Contrast Colour enhancement C (Hue) Smart picture C Picture format o

TV menu

Press the MENU (a) key on the remote control to summon the main menu.

Note: When the main menu is accessed from the keypad in front of the TV receiver box, it has an additional Exit item, which lets you dismiss the menu. Warning: The main menu is completely different when a VGA source is displayed. See p. 27.

Picture menu

Press the cursor right to select Picture.

Select the menu items in the Picture menu with the cursor up/down. Adjust the settings with the cursor left/right or enter the list of submenu items with the cursor right.

Select a submenu item with the cursor up/down.

Note: To remove the menu background before adjusting the picture settings, see Select TV setup, General, p. 7.

Contrast

This control allows you to adjust the contrast level of the picture.

This control allows you to adjust the brightness level of the picture.

This control allows you to adjust the colour saturation of the picture.

Sharpness

This control allows you to adjust the edge definition of a picture.

This control allows you to select the colour temperature of the picture: Normal, Warm or Cool.

Digital natural motion

Line doubling eliminates line flicker, motion compensation reduces jitter and offers smooth, yet sharp motion reproduction in movie broadcasts. Select On or Off to really see the difference in picture quality.

Dynamic Contrast

This feature automatically makes the contrast in the darker and the brighter picture areas more noticeable as the image on screen changes. Normally, select Medium. It may be preferred to select Minimum, Maximum or Off.

DNR (Digital Noise Reduction)

This feature automatically filters out and reduces the image noise and improves picture quality when receiving weak video signals. Select Off, Minimum, Medium or Maximum according to the image noise present.

Picture Contras Singinthesis Coleur Sharpness Dig. natural motion (Dynamic Contract DMR 6 (Hue) Smart picture (Picture format

Bass Balance Headphone volume (Surround mode) ((Dual 146) (Mono/Stereo) (filicam/Analogue) I (Night mode) (Audio only) 🤇

Colour enhancement

When activated, this feature automatically controls green enhancement and blue stretch. It makes the colours more vivid. Select On or Off in order to activate/de-activate Colour Enhancement with the cursor right.

Hue (only available when a NTSC peopleral is connected)

This control allows you to adjust the colour mix of the picture.

Smart picture

This menu item performs the same as the Smart key on the remote control. See Use of the remote control, p. 12. Smart settings will be set to Personal if the following settings are changed manually: contrast, brightness, colour, sharpness, dynamic contrast, colour enhancement or DNR.

Picture format

This menu item performs the same as the EB key on the Remote Control See Use of the Remote Control, p. 11.

Sound menu

Select the menu items in the Sound menu with the cursor up/down and adjust the settings with the cursor left/right.

Remember, control settings are at normal mid-range levels when the bar scale

Note: In case of a Cinema Link configuration and the Cinema Link is activated, the menu functions Surround mode, Night mode and Audio only of the Sound menu are steered by the audio receiver instead of by the receiver box. See the separate Cinema Link booklet supplied.

This control allows you to adjust the volume level.

Treble

Treble attenuates or amplifies the high-frequency response of the audio output signal.

Bass

Bass attenuates or amplifies the low-frequency response of the audio output signal.

Balance

This control allows you to adjust the balance of the right and left speaker's sound output.

Sound Torble Refere Headahone volume (Surround mode) (Dual I-II) (Mono/Stereo) (Nicam/Analogue) (Night mode) (Audio only) Smart sound O

Headphone volume

This control allows you to adjust the volume level of the headphone.

Surround mode

Only selectable with a Cinema Link configuration. See separate booklet supplied. Dependent on the Cinema Link configuration and the sound signal broadcasted, select one of the Surround modes.

Dual I-II (Only available with dual sound transmission)

This control allows you to switch from Language I or Language II during dual sound transmission.

Your selection is stored per TV channel.

Mono/Stereo (Only selectable in case of analogue stereo transmission)

Select Mono or Stereo with the cursor left/right.

When Stereo has been selected, the television will reproduce any stereo broadcast signal it receives

If Stereo is not present on a selected programme and the TV is placed in Stereo mode, the sound coming from the set will remain monaural. Your selection is stored per TV channel.

Nicam/Analogue (Only selectable in case of Nicam transmission)

Select Nicam or Analogue if the TV channel transmits digital sound. In case of weak digital sound signals, due to the transmission, select Analogue. Your selection is stored per TV channel.

Night mode

Only selectable with a Cinema Link configuration. See separate booklet supplied.

Audio only

Only selectable with a Ginema Link configuration. See separate booklet supplied.

Smart sound

This menu item performs the same as the Smart sound \$\infty\$ key on the remote control. See Use of the remote control, p. 12. Smart settings will be set to Personal if the following settings are changed manually: treble and bass.

Features menu

Select the menu items in the Features menu with the cursor up/down and adjust the settings with the cursor left/right.

Programme list

This list will display all the stored TV channels. Select a programme number with the cursor up/down.

Press the OK key to switch over to the selected TV channel or external.

Sleeptimer

With the sleeptimer you can set a time period after which the TV should switch itself to standby

The counter runs from 0 min, up to 180 min

One minute before the TV is set to go to standby the remaining seconds and a message appears on screen. You can always switch off your set earlier or change the set time.

Note: When a VGA source is selected, the TV will not go to standby when the sleeptimer expires.

Select subtitles

TV channels with teletext often transmit programmes with subtitling. For each TV channel you can store a subtitle page which will be displayed continuously if the programme being broadcast is transmitted with subtitles.

Switch on teletext and select the proper subtitle page from the index. Switch off teletext.

Now the subtitle page is stored for the selected TV channel

Once subtitles have been stored and Subtitle On has been selected they will automatically be displayed on the selected TV channels if subtitles are in the transmission.

A symbol will indicate that the mode is on

Select On during mute when you want to have the subtitles automatically been displayed when the sound has been temporarily interrupted with the

key on the remote control.

Child lock

The Child lock feature allows you to lock TV channels and externals to prevent children from watching certain programmes. A VGA source can not be locked.

Select Child lock with the cursor down.

Press the cursor right to enter the Child lock menu. You're summoned to enter your code. Enter the access code. Note: You have to re-enter your code each time you've left the child lock menu.

Important: You have forgotten your code!

- · Select Cancel with the cursor down.
- Select Set/Change code in the Setup menu. See General menu, Set/Change code, p. 8.
- Select one of the menu items of the child lock menu.
 - · Select Lock if you want to lock all channels and externals.
 - . Select Custom lock and press the cursor right.
 - Select Programme lock if you want to lock the programmes from a certain TV channel or external
 - Select Lock after if you want to lock all programmes from a certain time onwards Press the cursor right and enter the time with the cursor up/down and

right. Press the OK key to validate.

Note: The entered time will remain valid for every day, untill you have selected Unlock

· Select Unlock to unlock all locked channels and externals at once.

Fregramme Sesptimer Subtitle (Lock Lock after Child lock (Custom lock Programme lock Unlock On timer o

Features

TV 0-00-

Features

Subtitle On

On during mute

Programme

Sleeptimer

Child lock O

Use of the menus 15

Use of the menus

Programme Sleeptimer Subritle Child lock On timer 0-0 Off VCR1 BBC1 Off BBC2 On timer O-On - CNN -- Daily ----- 15:45 TVE

On timer

With the On timer function you can make your TV automatically switch to a specific programme number from standby or switch over to a different programme number at a specific time

Note: Your TV receiver box and your monitor should not be powered off with the (b) power key.

Select On timer with the cursor down.

Select On with the cursor right.

Press the cursor right again to enter the channel list.

Select the TV channel or external you want your TV to switch to on a selected time and day. Not possible with a VGA source.

Press the cursor right again to select a day of the week or to select Dally.

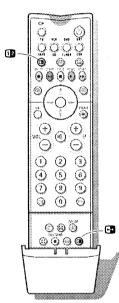
Press the cursor right once again to enter the time.

Enter the time with the digit keys or with the cursor up/down.

Press the OK key to activate.

Press the MENU (key to turn off the menu.

Note: To check your timer settings, press the 13 key.



Dual screen/PIP (FTR 9964 only)

Press the TB key to turn on or off Dual screen or PIP, according to the format selection made in the Dual screen format list in the General menu. See Setup, General, p. 7.

Audio from the main screen (the left screen in Dual screen and the full size screen in PIP) plays to the speakers;

Audio from the right screen or from the PIP plays to the headphones.

Note: Continuing to hold the 12 key down will cycle the TV through the various formats (Dual screen, Large PIP, Medium PIP, Smail PIP), launching a new format after each second the key is held down.

To highlight a screen

Pressing the cursor left/right will toggle the highlight between the left and the right screen or between the main and the PIP screen. The highlighted screen is made visible with a yellow border.

Changing TV channels or external sources in left, right or PIP

Press the - P + key, the digit keys or the P4P key in order to change the TV channels or the external sources in the highlighted screen.

Making the PIP screen movable

Select a PIP format.

Highlight the PIP picture with the cursor left/right.

Press the OK key to make the PIP screen movable.

The PIP screen can now be moved. This is made visible with a blue border around the PIP screen.

Press the cursor up/down, left/right to move the PIP screen in the direction

Press the OK key again. The PIP screen position is fixed.

Swapping screens

Press the 🕞 key to swap the left and the right screen or the PIP screen.

On-Screen information

The On-Screen information, which appears when changing channels, always refers to the highlighted screen.

Deactivating Dual screen mode

Press the R key again to return to a full main screen picture. The TV tunes to the picture which was highlighted in Dual screen mode.

When Dual screen mode is selected two picture formats are supported Full screen or 4:3 letterbox picture format.

PIP 12

Multipip (FTR 9954 only)

In the Setup menu, General, p. 8 you selected which Multipip format you prefer to see.

Press the key on the remote control to toggle the selected Multipip

The main screen displays the channel or source tuned before Multipip was activated and the highlight is on the main screen.

- Press the cursor left/right, up/down to highlight a PIP screen. When the highlight is on one of the PIP screens, it begins playing video and the other PIPs freeze. The main screen always continues playing audio and video.
- Pressing the P + or the P4P key or the digit keys changes the channel or source for the currently highlighted screen.

Note: channels cannot be added or deleted from the Smart surf list when Multipip is activated.

- Press the 🔁 key to swap the highlighted screen and the main screen.
- With PIP 3 and PIP 8: press the cursor up/down to display a following series of PIP screen.

With PIP 12: highlight the PIP picture in the bottom right and press the cursor down to display a following series of PIP screen.

Note: Only TV channels which are in the forcurite list and pictures from the connected and activated externals are displayed in the PIP screen. PIP3 and PIP8 are not possible when a WGA source is displayed as main screen.

Teletext Guide

TV channels which broadcast teletext also transmit a page with the programme guide of the day.

If the displayed teletext programme guide page satisfies the Video Programming via Teletext (VPT) requirements, it will be possible to record, remind, watch or lock programmes.

Press the @ key.

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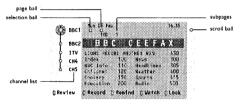
cursor to

adjustments

田

OK key

- Select a TV channel with the cursor up/down and press OK.
- Move the cursor up to the top of the channel list where the name of the selected TV channel reappears.
- Press the cursor right to move the puck over the selection ball.
- In the teletext index page, look for the programme guide page of the day or the following day.
- Enter with the digit keys, the programme guide page number. Press the cursor right twice to move the puck to the right to choose one of the subpages if available.



If the selected programme satisfies the VPT requirements, the TV will remember the last selected teletext page number of that channel that contains programme guide information and indicates which programme starts at what

Every time you press the () key, the teletext programme guide page of the selected TV channel will be available.

Note: The broadcaster is responsible for the content of the information.

Basic functions

Press one of the grey, red, green, yellow or blue keys to activate a Teletext Guide function. The keys appear in grey if the function is not available.

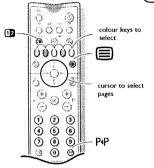
Review: this menu provides a list of programmes that are marked as reminders, those that have to be recorded and those that are locked. This menu can be used to change or remove marked programmes.

Record: to programme the recording of the video recorder (if it has a NEXTVIEWLink function and is connected to EXT. 2).

Remind: to automatically switch on the TV if it is in standby or to display a message if the TV is on.

Lock to lock certain programmes to prevent recording or watching. For the functions Record, Remind or Lock, a small menu pops up in which you can choose the interval: once. daily or weekly, or clear an earlier made record, remind or lock setting The default interval is set to Once. To confirm the frequency, press the OK key.

Watch: to watch the selected and currently broadcast programme.



Teletext

Most TV channels broadcast information via teletext.

Depending on the TV channel, teletext is transmitted in different systems. The colours used in the bottom line of the teletext page correspond with the colour keys of your remote control.

Switch Teletext on and off

Press (to switch the teletext on or off.

The main index page appears on the screen together with an information line at the top, an option line at the bottom and a puck in the top left corner of the screen.

Select a Teletext page

With the digit keys

Enter the desired page number with the digit keys.

The page counter seeks the page or the page appears immediately when the page number has been stored in the memory.

A message appears when you have entered a non existent or incorrect page number. Page numbers beginning with 0 or 9 do not exist. Chouse another number.

With the option line

Select with the colour keys, corresponding to the coloured options at the bottom of the screen, the desired subject.

Select Picture/Teletext

Select a TV channel which broadcasts teletext.

Press to switch the teletext on.

Press the 🔟 key.

The screen is divided into two parts:

the left side for the normal main picture,

the right side for teletext broadcast by the selected TV channel.

Press the key to return to a full screen picture or press the key to return to a full teletext picture.

Quickly run through the teletext pages

Press the cursor up/down or the - $\bf P$ + key to run through the previous or the following pages.

Select the previously selected teletext page

Press the P4P key

Note: Only possible when teletext pages are active, not when the Teletext menu is displayed.

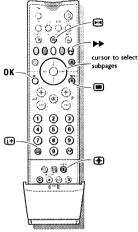
Select the index teletext page

Press the grey colour key >> to display the main index (usually p.100).

Only for T.O.P teletext broadcasts:

 $\mathsf{T.O.P}$ orders the pages in categories and adds other possibilities of enhancing ease of use.

Press [①]. A.T.O.P. overview of the teletext subjects available is displayed. Not all TV channels broadcast T.O.P. teletext. When the teletext system is not T.O.P. teletext. a message appears at the bottom of the screen. Select with the cursor up/down, left/right the desired subject and press the OK key.







Select subpages

When a selected teletext page consists of different subpages, one of the subpages appears on the screen.

Press the cursor right to highlight the subpagenumber.

Press the cursor up/down to select the next or previous subpage or enter the subpagenumber with the digit keys.

Teletext menu (only available in full screen teletext mode)

Press the MENU key to activate the menu.

Press the cursor up/down to select the menu items.

Favourite

This list contains up to eight favourite teletext pages.

Only the pages of the current channel can be selected.

Press the cursor right to add the current page or to select one of the

favourite pages to the list.

Press the **OK** key or the cursor right again to add.

Press the cursor left to return to the Teletext menu.

Search

On the virtual keyboard on screen you can type in a word you want to search for in the teletext pages. Whether upper- or lowercase is used has no influence. Searching for numbers is not possible.

Press the cursor left/right, up/down to select the characters, words or functions

Press the OK key to confirm each character selected.

Select Cancel to cancel the word or character selected.
Select Space to enter a space: Delete to delete the last character selected;
Shift to switch between undercast or capital characters; Special to display special characters on the keyboard.

Press the cursor left repeatedly to return to the Teletext menu again.

earching a word

Type in the word on screen or select a word from the history list on the right. Whether upper- or lowercase is used has no influence. Searching for numbers is not possible.

Select Search and press OK again.

The message Searching appears.

When the word is found, it is highlighted in the teletext page

To continue the search, press the **OK** key twice. When a word is not found, a message appears.

To search for a new word, select Keyboard and press OK.

Select the new word.

leveal

Reveals/conceals hidden information on a page, such as solutions to riddles and puzzles. Press the **OK** key to activate.

Press OK again to return to the Teletext menu.

Cycle subpages

Makes the subpages cycle automatically. Press the OK key to activate.

Timed page

To display a specific page at a certain time.

Press the cursor right to select Yes or No.

Enter the time and pagenumber with the cursor keys or the digit keys.

Note: Teletext does not have to remain switched on. It is not possible to display a timed page when in VGA mode or when the TV is switched to standby.

Language

If the displayed characters on screen do not correspond with the characters used by the teletext broadcaster, you can change the language group here.

Select Group 1 or Group 2 with the cursor keys left/right.

To leave the Teletext menu

- Press the mENU key.
- Press the cursor right.
- Press the cursor left twice to put the puck on the neutral spot again.

Special teletext functions

Hold

Press to stop the automatically rotating of the subpages or to stop the page counter from seeking when you have entered a wrong page number or when the page is not available. Enter another page number.

Enlarg

Press Tepeatedly to display the upper part, the lower part and then to return to the normal page size. When the upper part is displayed, you can scroll the text, line by line using the cursor up/down.

Hypertext

With hypertext you can select and search for any word or number on the current teletext page.

- Make sure you are not in the teletext menu and that the puck is in the upper left corner of the screen.
- Press the cursor key down to highlight the first word or a number on the page.
- Use the cursor up/down, left/right to select the word or number you want to search for.
- Press the OK key to confirm.
 - A message appears at the bottom of the screen to indicate that the searching is going on or that the word or page is not found.
- Press the cursor right to leave hypertext.

Select Continuous Subtitles

TV channels with teletext often transmit programmes with subtitling. For each TV channel you can store a subtitle page which will be displayed continuously if the programme being broadcast is transmitted with subtitles.

Switch on teletext and select the proper subtitle page from the index. Switch off teletext.

Now the subtitle page is stored for the selected TV channel.

Once subtitles have been stored and **Subtitle On** has been selected they will automatically be displayed on the selected TV channel if subtitles are in the transmission.

Select Subtitle On or Off in the Features menu, see p. 16.

The subtitle symbol appears when Subtitle On is selected.

Teletext 23

Connect Peripheral Equipment

There is a wide range of audio and video equipment that can be connected to your receiver. The following connection diagrams show you how to connect them to the back or the front side of the receiver.

Note: in case of the monitor in a stand alone situation without the receiver box connected, see the instructions with the monitor.

n k

Philips Cinema Combination

If you dispose of a Home Cinema combination (Cinema Link audio receiver and/or Cinema Link video recorder and/or DVD player), see the separate supplied instruction manual.

Video recorder

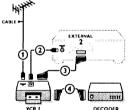
Note: Do not place your indea recorder too close to the screen as some indea recorders may be susceptible for signals out of the display. Keep a minimum distance of 0.5 m to the screen.

Connect the supplied aerial cables ①, ② and, to obtain a better picture quality, a eurocable ③ as shown opposite.



If your video recorder is provided with the EasyLink function, the eurocable supplied with it, should be connected to EXTERINAL 2 to benefit of the EasyLink function.

Only if you do not connect the eurocable 3), you have to do the following:



Search for and store the test signal of the video recorder

- Unplug the aerial cable 1 from the aerial socket T of your video
- Switch on your TV and put the video recorder on the test signal. (See the handbook for your video recorder.)
- Search for the test signal of your video recorder in the same way as you searched for and stored the TV signals. See Installation, Searching for and storing TV channels, Manual Installation, p. 6
- Store the test signal under programme number 0 or between 90 and 99.
- Replace the aerial cable in the aerial socket " of your video recorder after you have stored the test signal.

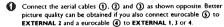
Decoder and video recorder

Connect a eurocable **(4)** to your decoder and to the special euroconnector of your video recorder. See also the video recorder handbook. See Decoder, p. 9.

You can also connect your decoder directly to EXTERNAL 1 or 2 with a eurocable.

24 Connect Peripheral Equipment

Video recorder and other peripherals



Look for the test signal of your peripheral in the same way as you do for a

When a video recorder is connected to EXTEPNAL 1 you can only record a programme from your TV tuner.

Only when a video recorder is connected to EXTERIAL 2 it is possible to record a programme from your TV as well as from other connected equipment. See Record with your video recorder, p. 30.

Note: EXTERNAL 1 can handle CVBS and RGB, EXTERNAL 2 CVBS, Y/C and RGB, EXTERNAL 3 and 4 only CVBS, EXTERNAL 5 YUV.



EXTERNAL 5

Camera & camcorder

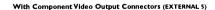
- Connect your camera or camcorder to the FRONT input behind the door at the front side of your receiver. Press the centre of the door to open.
- Connect the equipment to VIDEO IN (2) and AUDIO L (1) for mono
- For stereo equipment also connect AUDIO R (1)

S-VHS quality with an S-VHS, Hi-8 or Digital camcorder is obtained by connecting the S-VHS cables with the S-VHS input (3) (instead of VIDEO IN (2) and AUDIO inputs (1).

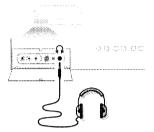




Connect your DVD player with a eurocable to one of the euroconnectors EXTERNAL 1 or 2.



- Connect the three separate component video cables to the DVD player's Y, U (Pb) and V (Pr) jacks and to the Y, Pb and Pr jacks on the receiver.
- Connect the audio cable to the DVD player's audio L and R jacks and to the L and R audio EXTERNAL 5 jacks on the receiver.



Headphone

- Insert the plug into the headphone socket $\bigcap_{i \in I}$ behind the door at the front side of the receiver. Press the centre of the door to open.
- Press K to switch off the internal loudspeakers of the TV. The headphone impedance must be between 8 and 2000 Chim. The headphone socket has a 3.5 mm jack.

In the SOUND menu select Headphone volume to adjust the headphone volume and balance and to select the audio source for your headphone sound. See p. 15.

Note: When a TV channel or external source is blocked via the Childlock menu (see p. 16), also the headphone is muted.

When Dual screen PIP is activated (see p. 18) (FTR 9964 only):

- if the main screen displays a TV channel picture, you hear the sound from the Dual screen/PIP picture through your headphone:
- if the main screen displays a picture from an external source, you hear the sound from the main screen through your headphone.

Multi channel Surround receiver

- Connect the audio cable to the multi channel Surround receiver and to AUDIO OUT L and R at the back of your TV receiver box (1).
- If you want the loudspeakers of your monitor to act as centre speaker, also connect an audiocable to the multi channel Surround receiver and to the SURROUND SOUND CENTRE IN at the back of your TV receiver box 2
- Select Centre mode On in the Setup, General menu. See p. 9.

The loudspeakers of the monitor will now only produce centre sound, the loudspeakers connected to the audio receiver will produce Surround Sound. The volume has to be controlled via the multi-channel Surround receiver.

Note: No sound will be heard when a TV channel or external source is blocked via the Child lock menu (see p. 16).

Connect your computer

See the separate supplied instruction manual with your monitor.

To select connected equipment

Equipment connected with an aerial cable only: Select the programme number under which you have stored the test signal with the digit keys.

Equipment connected to a euroconnector, to the VGA MONITOR IN connector or to the front side of the receiver box Press the key repeatedly to select EXT1. EXT2. EXT3. EXT4. EXT5.

FRONT or VGA. according to where you connected your equipment at the back or the front side of your receiver.

Remark: Most equipment (decoder, video recorder) carries out the switching itself. This is however never the case with a computer connected to the VGA input.

If you want to change to TV channels?

Enter the programme number of the TV channel which you want to watch with the digit keys.

VGA menu

Only available when a VGA source has been connected and activated. See also the separate supplied instruction manual with your monitor.

- Select VGA with the A key and press the OK key to confirm
- Press the MENU (key to switch on the VGA menu.

	Picture 1	Picture 2	Sound	Setup
VGA				oʻ

- Select one of the menus with the cursor left/right.
- Select one of the menu items with the cursor up/down. See the separate booklet supplied with the monitor

Picture 1 Picture 2 Sound

•	D	

- Contrast.
- Colour temperature,
- \$\$\text{Sharpness,}

Format,

Zoom factor.

(): Bass.)

(Volume.)



- (& Treble,) (CO Sound mode)
- (PA AV3.)
- (VGA2)

⊕ Shift, Clock frequency,

Q Zoom.

- II Phase,
- কি Auto align
 - Press the cursor left/right to alter the selected adjustment.
 - Press the MENU (key again to switch off the VGA menu.

Video recorder with EasyLink

The video recorder can be operated via the VCR menu on screen.

- Press the MENU (a) key on the remote control.
- Select the VCR menu with the cursor up/down.



- Press the cursor left/right, up/down to select one of the VCR functions:
 - Rwd

play back: scan at Slow, Min, Med, Max speed

play forward: scan at Slow, Min, Med, Max speed,

Rec

select and press the OK key to eject the tape.

The key INSTANT • for recording, under the door of the remote control, can be operated in the TV mode.

If your EasyLink video recorder has the system standby function, when you press the (b) key for 3 seconds, both TV and the video recorder are switched to standby.

Audio and video equipment keys

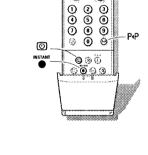
Most of the audio and video equipment from our range of products can be operated with the remote control of your TV.

Press the VCR, DVD, SAT, TUNER, CD, TAPE or CDR key according to the equipment you want to operate with this remote control. See Use of the remote control, p. 10.

Video recorder without EasyLink

Press one of the video recorder keys after you pressed the VCR key:

- for rewind.
- for stop,
- for fast forward.
- for selecting 1- or 2-digit programme numbers from the video
- for sequential programme selection from the video recorder tuner,
- to select a programme number from your video recorder tuner,
- to switch the video recorder to standby
- **(** VCR timer

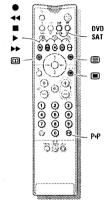


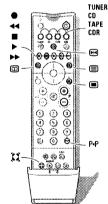
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Connect Peripheral Equipment 27

28 Remote Control functions for peripherals





DVD keys

Press one of the following keys after you have pressed the DVD key.

- to switch the DVD menu on or off
- to select a DVD chapter
- to select a DVD title
- to select your choice of subtitle language
- for search backward
- for play
- for search forward
- to select a programme number from your DVD

Press one of the TV keys after you have pressed the SAT key.

Tuner, CD, Tape and CDR keys

Press one of the following keys after you have pressed the TUNER, CD, TAPE or CDR key.

- to switch the menu on or off (tuner)
- to select a frequency (tuner)
- to search down (tuner); rewind (CD/tape); speed down (CDR)

- to search up (tuner); forward (CD/tape); speed up (CDR)
- RDS news/TA (tuner); select following disc (CD/CDR)
- 1 pause (CD/CDR/tape)
- RDS display (tuner); info on screen (CD/CDR)
- next/previous (CD) . P 4
- surround modes (CD/CDR/tape)

Record with your video recorder without EasyLink

To record S-VHS quality, connect an S-VHS peripheral directly to the video

Record a TV programme

- Select the programme number on your video recorder.
- Set your video recorder to record.

See the handbook for your video recorder.

Switching programme numbers on your TV does not disturb recording!

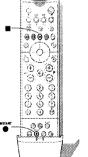
Record a programme on your video recorder connected to EXTERNAL 2 from Audio/Video equipment connected to EXTERNAL 1, EXTERNAL 3, EXTERNAL 4, EXTERNAL 5 or to sockets on the receiver

- Switch on the equipment.
- Select the correct external on your video recorder.
- Set your video recorder to record. You record what you are watching on the screen.

Do not switch programme numbers or do not switch off your TV when you are

Record with your video recorder with EasyLink





If you have connected an S-VHS video recorder provided with the EasyLink function. you can record S-VHS quality from an S-VHS peripheral connected to the front side of the receiver. (E.g. from an S-VHS camcorder.)

In TV mode, it is possible to start a direct recording of the programme which is being displayed on the TV screen.

Press the INSTANT • record key, under the door of the remate control of the TV or of the video recorder or the record key on the video recorder.

The video recorder switches on from standby and a message of what is being recorded appears on the screen.

- The video recorder starts recording the programme you are watching.
- Press the key to stop the recording.

Do not switch programme numbers or do not switch off your receiver when you are

When recording a programme from a peripheral connected to EXTERINA 1. 3, 4. 5 or FROM, you can not select another TV programme on the screen. To watch TV programmes again, press the programme number you want to select

Attention: the recording is stopped and your video recorder switches to standby.

If you switch to standby during recording of a programme from a peripheral connected to External 1, 3, 4,5 or Facilit, the blinking lamp on the front of your receiver indicates that you are still recording. The blinking stops after the recording is finished.

Recording from EXTERNAL 5 will only have black and white pictures.

Tips

Poor Picture

- · Have you selected the correct TV system?
- · Is your monitor or house aerial located too close to loudspeakers, non-earthed audio equipment or neon lights etc.)
- . Mountains or high buildings can cause double pictures or short images Sometimes you can improve the picture quality by changing the direction of the aerial.
- Check if you have entered the correct frequency, See Installation, p. 6.
- · Are brightness and contrast out of adjustment? Select Factory settings in the Setup, General menu, p. 8 or press the SMART | key repeatedly.

No picture or no sound

- · Are the supplied cables connected properly? (The aerial cable to the TV receiver hox the other serial to your VCR, the VGA cables to the display, the power cables)
- · Has the childlock (p. 16) been switched off?
- · Is your PC switched on?
- · Has the Centre mode been switched off?
- · Do you see a black screen and the indicator in front of the monitor lights up green, this means that the display mode is not supported. Switch your VGA-source to a correct mode.
- . In case of weak or bad signal, consult your dealer

Remote control

- . If your monitor no longer responds to the remote control, the batteries may be exhausted
- You can still use the MENU keys at the front of your receiver.

Menu

Have you selected the wrong menu? Press the same key again to exit from the menu.

Control of peripheral equipment The infrared signals of the screen may

influence the reception sensibility of other peripherals.

Solution: replace the batteries of the remote control or change position of other equipment. E.g. keep away a wireless headphone from within a radius of 1.5 m.

TV-Guide - Displayed time is wrong The broadcaster on programme number one does not transmit the correct local date and time. Use Reshuffle in the

INSTALLATION menu to place another broadcaster on programme number one. No stable or not synchronised VGA

picture . Check if you have selected the correct VGA mode in your PC. See the separate instruction manual with the monitor

If your problem is not solved:

Switch both your monitor and your receiver off and then on again. Never attempt to repair a defective monitor or receiver yourself. Check with your dealer or call a TV technician.

End of life directives

We are paying a lot of attention to using environmentally-friendly production methods. Your new flat colour television contains materials which can be recycled and reused.

At the end of life specialised companies can dismantle the discarded flat colour television to concentrate the reusable materials and to minimise the amount of materials to be disposed of.

Please ensure you dispose of your old flat colour television according to local regulations.

How to dispose of exhausted batteries?

The batteries supplied do not contain the heavy metals mercury and cadmium Nevertheless in many countries exhausted batteries may not be disposed of with your household waste. Please ensure you dispose of exhausted batteries according to local regulations.

TV receiver box with speakerless monitor

In case you connect your TV receiver box with a speakerless monitor, and without having connected an audio receiver, all references made in this instruction book to sound reproduction, volume control, and audio connections, are not applicable (except for a headphone connection). The keys on the remote control referring to sound have no function either.

Miscellaneous

- Ambient temperature: + 5~ + 40°C Mains: 50/60 Hz Auto Voltage ranging from 95 V to 264 V
- Power consumption: around 35 W
- Standby consumption: 2 W
- Weight (excl. packaging): 4 kg
- Dimensions (wxhxd)
- Receiver: 43.5 x 10.5 x 33 cm

DNR

Glossary

programme name.

Child Lock

Cinema Link

Home Cinema

Automatic Channel Installation (ACI)

Automatically installs all TV channels in

the same order as offered by your cable

is transmitted. It also automatically

With ACI, channel installation is fully

Feature to prevent unauthorised use of

and operated with the remote control.

Cinema Link is a new Philips feature in

video peripherals like DVD player and

video recorder communicate with each

other, on condition they are all equipped

with the Cinema Link functionality and

automatically offer the highest quality

surround sound to create your own

combination of picture and multi channel

connected via a eurocable. They

which the TV, the audio receiver and other

your TV. The TV can only be switched on

includes programme number and

automatic, simple and fast.

company, provided of course that the data

Dynamic Noise Reduction. By encoding signals digitally in 100 Hz sets with Digital Scan it is possible to clean up picture noise. This is especially beneficial in poor signal areas and when viewing poor quality video tapes.

Easy Link

Digital 'intelligent' ESI bus-system between audio components in HiFi systems and between TV and VCR. (Scart connection required). Turns source selection and control into a one-key operation.

Easy Text

Teletext memory that automatically memorises Teletext pages and gives you instant access to them

Euroconnector

A 21-pins connector system enabling you to simply connect various types of audio/video and computer equipment.

Menu

On-screen display of functions and facilities in a well-organised survey.

NTSC

The broadcasting system used in the USA, Japan and parts of South America and Southeast-Asia.

Picture Freeze

TV mode which allows you to "freeze" a certain image in order to study a specific detail at ease, e.g. to make notes of certain programme information like phone numbers.

Smart Picture and Sound Controls

Keys on the remote control to select predefined picture and sound settings.

Sleeptimer

Function with which you can set a time period after which the TV should switch itself to standby.

Teletext

See also Easy Text WST: World Standard Teletext. FLOF: Full Level one Features, System applied by the BBC, RVE..., that provides a fast access to the teletext pages. TOP: Table of (Teletext) Pages, German system for an easy access to the teletext pages.

Wide screen format

Some external devices (e.g. VCR, DVD) SAT) can be configured with their local menus to output pictures in 16:9 picture format, in this case the wide screen picture format makes the picture fill the screen without distortion

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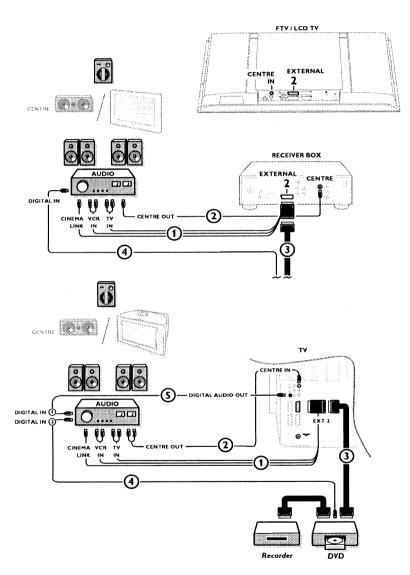
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Directions for Use





Note: The Cinema Link functionality is only available with devices of the Cinema Link (P50.3) generation! Cinema Link is a new Philips feature in which the TV, the audio receiver and other video peripherals communicate with each other (on condition they all are equipped with the Cinema Link functionality and are connected via a eurocable). They automatically offer the highest quality combination of picture and multi channel surround sound to create your own Home Cinema.

With one key on the remote control, with which you can control all Cinema Link products, your total Cinema Link system will be started and the DVD or video recorder will start to play and the audio receiver will provide the sound (on the condition Cinema link is enabled) on behalf of the TV.

The TV or monitor can function as the centre speaker of your system, making a separate centre speaker unnecessary (only in case your TV or receiver box is equipped with a Centre IN connector). By pressing the standby key (¹) on the remote control for at least 3 seconds, the complete Cinema Link system will be switched to standby.

Recommended:

Do not use the AC outlet at the back of the audio receiver to power the DVD or the video recorder in a Home Cinema configuration.

Configuration of the Cinema Link peripherals

The connection diagram in the inside cover shows you how to connect the Cinema Link peripherals with each other.

Nates:

- Besides the TV or receiver box at least one peripheral should be provided with the Cinema Link functionality to benefit from this feature.
- To take advantage of the highest quality of multi-channel Surround sound it is advisable that you have a Cinema Link audio receiver connected.
- The peripherals connected don't need to see the TV remote control in the Cinema Link system. The commands given to the TV are automatically passed to the other peripherals. This allows you to put the peripherals behind the doors of a cobinet or to place them in another room.
- To enjoy Digital Surround playback, the digital device (e.g. DVD) should be connected to the digital input of the audio receiver with a separate cinch audio cable ① In case your TV is provided with a DiGIRL AUDIO OUT connector, also connect it to one of the digital input connectors of your audio receiver ③ If you connect the digital audio output connector of your TV and/or peripheral equipment to a digital input connector of your audio receiver ④ and ⑤ (if present), select the appropriate digital input (1 or 2) in your audio receiver.
- The optional wireless speakers of the TV cannot be used.

Preparation and Operation

- Cinema Link is switched on as soon as the audio receiver and the TV are switched on. If necessary, Cinema Link may be switched off or on again only on the audio receiver. See the instructions for use of your audio receiver.
 - Important When Cinema Link is switched on all audio commands control the audio receiver instead of the TV.
- The message CINEMALINK ON is displayed on the audio receiver and on the TV. Now the CinemaLink system is activated.

Note: it is recommended to disable CinemaLink when the receiver is used to record a CD e.g. or when using a headphone when others are watching TV.

Now you can adjust the initial TV settings for optimal surround sound and install the audio channels before starting up one of the CinemaLink devices. The system information about country choice, menu language and picture format you set up during the installation of the TV is transferred to the audio receiver automatically.

TV as centre speaker (only in case your TV or receiver box is equipped with a Centre IN connector)

See the Instructions for Use of the TV or receiver box, Setup, Source menu, Centre input. Use the test tone function in the Speakers menu to have a reference of the loudness of the separate speakers.

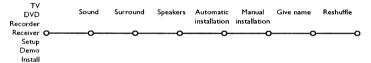
Note: If you want the loudspeakers of your TV or monitor to act as centre speaker, also connect a cinch audio cable (not supplied) ② to the CENTRE IN connector of your TV or receiver box.

Activating CinemaLink

Continue to press the en-key on the remote control for more than 4 seconds.

- The TV or receiver box sends a play command to the Cinema Link DVD player, if present.
- The DVD player will start playing and the audio receiver automatically switches to the best Cinema Link sound.
- f no DVD player is connected or if the DVD player has no disc loaded, the command can not be executed
- The TV or receiver box will then send a play command to the Cinema Link video recorder, if present.
- The video recorder will start playing and the audio receiver selects the best Cinema Link sound.
- If no video recorder source is connected or tape is loaded, the TV or receiver box will select the last watched TV channel

Receiver menu



Note: When Cinema Link is enabled, certain items of the Sound menu (see TV menu) are steered by the audio receiver instead of by the TV or receiver box.

- Press the MENU key on the remote control.
- Press the cursor down to select Receiver.
- Press the cursor right to enter the Receiver menu items.
- Press the cursor up/down to select the submenu items.

Note: the audio receiver submenu items may only be selected if provided by the audio receiver (dependent on the configuration setup and the sound signals transmitted).

Sound menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu

Sound Receiver O-Smart Sound Treble Rass Loudness C 3D effect C Night mode (Audio Only O

Smart Sound, Treble, Bass

See the Instructions for Use for the TV or receiver box.

Loudness

When Loudness On is selected and when listening at low volume, the low and high frequencies are amplified so that the natural balance is restored.

3D effect enables you to experience the effect of Dolby Surround Pro Logic without the need of having rear speakers connected or activated

Select the level of 3D effect with the cursor left/right.

Night mode (only functional with Dolby Digital sound broadcasting input)

The loud parts of the sound are lowered and the soft passages are raised. You can enjoy surround sound without disturbing sleeping children or neighbours.

Audio only

This control enables you to blank the TV picture if the TV or monitor is used as centre speaker in the Cinema Link system and if the audio receiver is reproducing sound unrelated to a TV picture. Switch Audio only On to only hear the sound and to switch off the picture. The message Audio only appears on screen.

Surround menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu

Surround Receiver 0 -000 Test Tone Front left volume Front right volume Centre volume Rear volume Rear left volume Rear right volume Subwoofer volume C

Adjustment of the volume level of the loudspeakers

Note: the test tone function is automatically cancelled by the audio receiver when leaving the Surround menu.

Select Test Tone On.

A steady noise tone is switched sequentially through the available loudspeakers, except for the subwoofer, for 2 seconds each. This enables you to have a reference of the loudness of each loudspeaker and to adjust the level of each until they all sound equally loud.

The loudspeakers activated light up in the screen graphic.

- Select the Surround menu items with the cursor up/down one after another and alter the selected adjustments with the cursor
- The best result is achieved when all speakers have equal volume in your usual listening position.
- Select Test tone Off when you have finished the adjustment of the speaker levels.

Speakers menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.

Once the number and position of the loudspeakers has been fixed, selecting Centre speaker, Rear Speakers and Subwoofer Yes or No, you can adjust the initial receiver settings, size and distance, for optimal surround sound

Note: after changing the configuration, the menu will disappear temporarily and re-appear again after the new settings will be updated.



Size of the speakers

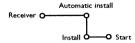
Select Small if your speaker is able to reproduce low notes down to at least 80-100 Hz. Select Large if your speaker is able to reproduce low notes down to at least 50 Hz.

- As a rule of thumb, a large speaker has a cone diameter of at least 12 cms (5 inches). See the specification sheet of your loudspeakers.
- If Subwoofer present is set to No, Front speaker size can only be set to Large. If Front speaker size is set to Small, Centre speaker size can only be set to Small and consequently a subwoofer must be connected

Distance to the speakers

Select the distance from your usual listening position to the available speakers each; front, centre and rear speakers. This defines the delay time for the surround sound.

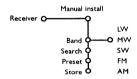
Automatic installation



In the Automatic installation menu select **Start** to activate the automatic searching of all radio stations which can be received.

The programme list is automatically filled with all the numbers and names of the radio stations transmitted.

Manual installation



You can also search for a known radio station by keying in the frequency.

- First select Band to switch to the desired waveband: LW, MW, SW, FM or AM.
- Select Search and press the cursor right.

 The frequency increases until a radio station is found.
 If you know the 3-digit frequency, enter it directly with the digit keys 0 to 9.

 Select Preset to enter the preset number using a three
- digit entry with the digit keys.

 To store your radio station, select **Store** and press the
- Repeat steps () to () to store another radio station.

Give name - Reshuffle

Give name Reshuffle

Receiver 0-0-0-0-0

To assign or change a name to a radio station or to change the order of the stored radio stations according to your preference, act in the same way as with giving a name or reshuffling the programme list of TV channels. See the Instructions for Use of the TV or receiver box.

Personal Notes:

4. Mechanical instructions

Index of this chapter:

- 1. Disassembly and Panel Overview
 - 1. Top Cover Removal
 - 2. Panel Overview
- 2. Service Positions and Panel Removal
 - 1. Front I/O Panel
 - 2. Double Window Panel (if present)
 - 3. Power Supply Panel
 - 4. Feature Box Module
 - 5. Small Signal Panel
 - 6. Down Scaler Panel (if present)
 - 7. Audio/Video Interface Panel
 - 8. High Definition Panel
 - 9. 3D Comb Panel (US only)
- 3. Re-assembly

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Disassembly and Panel Overview

4.1.1 Top Cover Removal

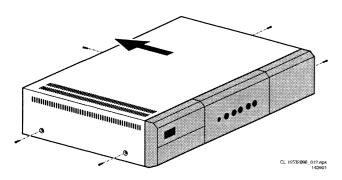


Figure 4-1 Top cover removal

- 1. For safety reasons, first unplug the mains cable.
- 2. Remove all fixation screws of the metal top cover.
- 3. Remove the metal top cover.

4.1.2 Panel Overview

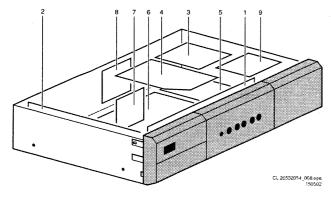


Figure 4-2 Panel overview

- 1. Front I/O.
- 2. Power Supply.
- 3. Double Window Panel (if present).
- 4. Feature Box.
- 5. Small Signal Panel.
- 6. Audio Video Interface.
- 7. Down Scaler panel (if present).
- 8. High Definition panel.
- 9. 3D Comb panel (US version only).

4.2 Service Positions and Panel Removal

4.2.1 Front I/O Panel

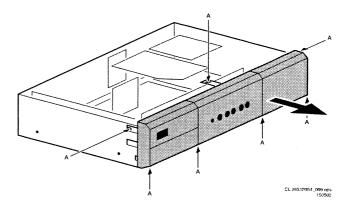


Figure 4-3 Front cover removal

Remove the front cover plate:

- Pull the lugs [A] on top, bottom, and both sides of the receiver box slightly aside.
- 2. Pull the front panel in the direction of the big arrow.

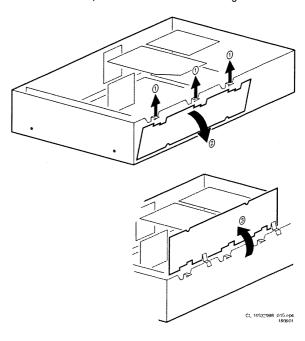


Figure 4-4 Service position Front I/O panel

Remove the front I/O panel:

- 1. Lift the clamps [1] to release the Front I/O panel.
- 2. Unlock the Front I/O panel from the receiver box [2].
- 3. Park the front I/O panel on top of the housing [3]. Use a protection sheet to prevent short-circuiting.

Note: Be sure to keep track of the three copper grounding clips; they can be lost very easily, or they can cause short circuiting when falling into the receiver box.

4.2.2 Power Supply Panel

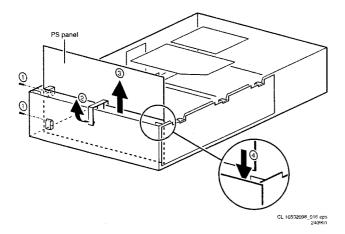


Figure 4-5 Service position Power Supply (PS)

- 1. Remove the front panel, if it was not yet removed.
- 2. Remove the screws [1].
- 3. Remove the fixation bracket [2].
- 4. Pull the Power Supply panel out of the receiver box [3].
- 5. Place the Power Supply panel in the small slots on the edges of the top of the housing [4].

Warning: Be aware of the live voltages on this board during operation!

4.2.3 Double Window Panel (if present)

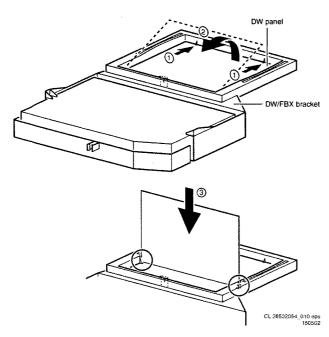


Figure 4-6 Service position Double Window panel

When the metal top cover is removed, the Double Window panel is accessible.

For the service position:

- 1. Release the clamps [1] and push the panel gently up and out of its bracket [2].
- One of the cables must be temporarily disconnected to place the Double Window panel in its service position as shown in the figure.
- 3. Lead the removed cable in a favourable position and connect this cable again.

4.2.4 Feature Box module

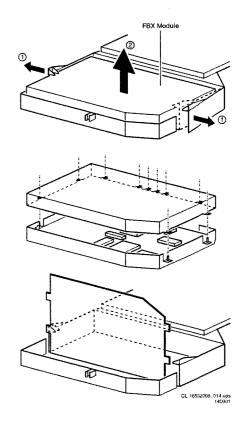


Figure 4-7 Service position Feature Box panel (FBX)

- Pull the clamps aside [1], and lift the Feature box module
- 2. Disconnect the cables and take out the module.
- Remove the shielding of the module: de-solder the fixation lugs.
- 4. Remove the Feature Box panel from the module.
- Connect the cables and place the Feature Box panel in service position in the regarding bracket.

4.2.5 Small Signal Panel

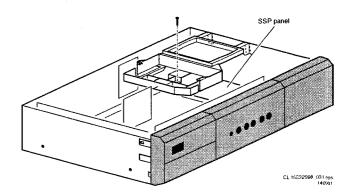


Figure 4-8 Removal of the Feature Box bracket

- 1. Release the clamps that secure the feature box module.
- 2. Lift the feature box module, disconnect the regarding cables and take out the module.
- Release the side clamps that secure the Feature box bracket.
- 4. Remove the screw in the middle of the feature box position and remove the complete bracket.

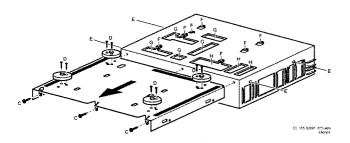


Figure 4-9 Removal of the bottom cover plate

To access the copper side of the Small Signal Panel, it is necessary to remove the metal bottom cover:

- 1. Turn the TV receiver box upside down.
- Remove the three screws [C] that secure the bottom plate at rear side.
- Remove the screws [D] that hold the four feet and remove the feet.
- Pull the metal bottom cover backwards (lift it over the studs [E]). Be aware of the hooks [F] on the frame.

Remove the Small Signal Panel:

- 1. Disconnect all cables.
- 2. Remove at rear side of the receiver box the three mounting screws that secure this panel to the back plate.
- Release the clamps that secure the Small Signal Panel and carefully take it out.

4.2.6 Audio Video Interface panel

If the metal bottom cover is removed, the copper side of the AVI panel is accessible.

Remove the Audio Video Interface panel

- Make sure that the Feature Box module and its bracket is removed as described above.
- Disconnect all cables.
- 3. Remove at rear side of the TV receiver box the three mounting screws that secure this panel to the backside.
- 4. Remove the four distance stud screws belonging to the PC/ MAC IN and MONITOR OUT sockets.
- 5. Release the clamps that secure the Audio video interface and carefully take out the Small Signal Panel.

Down Scaler Panel (if present)

- 1. This Down Scaler panel stands normally in an upright service position.
- To remove this panel: pull it firmly out of its connectors, mounted on the Audio Video Interface.

Note: Be sure to keep track of the two copper grounding clips; they can be lost very easily, or they can cause short circuiting when falling into the receiver box.

HD/SD (High/Standard Definition) Panel 4.2.8

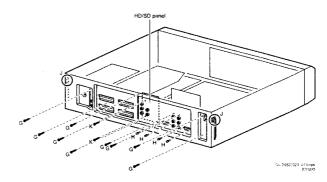


Figure 4-10 Removal of the HD/SD connector panel

There is no service position defined for this panel. The best way to perform measurements on this panel is to remove the Feature Box bracket as described above. Then the component side of this single sided panel is accessible.

To remove the HD/SD panel:

Unscrew the screws that hold the panel (on the inside of the TV

4.2.9 3D Comb panel (US only)

- 1. Remove both mounting screws
- Turn it in a favourable position and lift it (if necessary release and lift the Feature Box bracket a fraction at right
- Release the cable from the special shaped cable clamp.

Note: Use a protection sheet to prevent short-circuiting if you place the unit in service position.

1. If necessary, you can remove the panel from its bracket. To do this, release the clamps that secure the panel in the bracket and remove the panel out of the bracket.

4.3 Reassembly

- To re-assemble the TV receiver, perform the disassembly processes in reversed order.
- Before re-placing the top cover, verify the correct connections for all the cables, and lead the cables in the original positions.

5. Service Modes, Error Codes, and Fault Finding

Index of this section:

- 1. Test Points
- 2. Service Modes
- 3. Problems and Problem Solving Tips (related to CSM).
- 4. ComPair
- 5. Error Codes
- 6. Protections
- 7. Repair Tips

5.1 Test Points

5.1.1 General

Perform measurements under the following conditions:

- · Set in Service Default Mode.
- Video: Colour bar signal, received via the internal tuner.
- · Audio: 3 kHz left, 1 kHz right.

Exceptions (when using external sources):

- · Set in Service Default Mode (SDM).
- Video: If using a DVD player, use a "live" picture. If using a VGA source, use a picture of your choosing.
- Audio: You can use a service generator, or the audio from the DVD player or VGA source.

5.1.2 Waveforms

The chassis is equipped with test points printed on the circuit board assemblies. Test points are displayed in two different ways:

- The old method, still in use for re-used circuits (like the Small Signal Panel, the Double Window Panel, and the Feature Box), refers to the functional blocks. The test points have names starting with I for IF, S for sound, etc. The numbering is in a logical sequence for diagnostics.
- The new method, used for new circuits, uses service test points that are recognizable as tagged Fxxx points. With this method, factory test points are published (F-points are functional test points, I-points are test points for in-circuit testers in the factory. All these test points are on the copper side. When the test point is a service test point, it is tagged for recognition.

Not all test points have been measured, but they can serve as identification names in Service communication (for example, ComPair fault find trees, Searchman files).

In the following cases, there will also be no waveform:

- When a Vdc voltage is displayed in the diagrams, or when the waveform does not have an additional value.
- When the sources are not easy accessible for the Service engineer (for example, VGA source).
- External AV inputs are not measured, since the waveform is equal to the source (dependent of load resistor matching).

5.1.3 DC voltages

The DC voltages are measured at practically all semiconductor pins. These values are displayed in the circuit diagrams. If a DC value is displayed between brackets then this value is measured in "standby" mode.

Note: DC voltages are also measured on the connectors.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the servicer and the customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements) and the FTV chassis. It offers the ability of structured troubleshooting, a test pattern generation, error code reading, software version readout, and software upgrading. (Software upgrading is not available for all chassis)

Minimum requirements for ComPair: a Pentium Processor, Windows 9x/NT/2000/XP/ME, and a CD-ROM drive (see "ComPair" section).

5.2.1 Service Default Mode (SDM)

Purpose

- To create a pre-defined setting to get the same measurement results as given in this manual.
- To override SW protections (only when SDM is entered via the "service pins" on SSP connector 0356).
- To start the "blinking LED" procedure.

Specifications

- Tuning frequency: 475.25 MHz for PAL/SECAM (the source is displayed on the screen)
- Colour system: SECAM L for France and PAL B/G for the rest of Europe.
- All picture settings at 50 % (brightness, colour, contrast).
- · Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes include:
 - Sleep timer.
 - Smart modes.
 - On Timer.
 - Child lock.
 - Black mute.

How to enter SDM

To enter SDM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: 062596 directly followed by MENU.
- Short pins 2 and 3 on connector 0356 of the SSP (the two pins that are nearest to the rear panel) while the set is in the normal operation mode.

Caution: Entering SDM by this method will override all processor-controlled protections. When doing this, the service technician must know exactly what he is doing, as this could damage the set.

 Use the Dealer Service Tool (DST) emulation feature of ComPair.

After entering SDM, a blank screen is visible, with "Service Default" in the upper part for recognition. The "blinking LED" procedure is started and will indicate any possible errors via the front LED.

How to navigate in SDM

To toggle to the SAM mode, press the following key sequence on the remote control transmitter: **062596** directly followed by **OSD** (i+).

How to exit SDM

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter (if you switch the set OFF by disconnecting the mains cable, the set will remain in SDM when mains is reapplied).

Service Alignment Mode (SAM)

Purpose

- To perform (software) alignments.
- To change the option settings.
- Easy identification of the software version.
- To view operational hours.
- To display (or clear) the error code buffer.
- To give the service technician the possibility (through a special sequence of navigating and selecting) to diagnose F21R problems with a standard PC monitor.

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Specifications

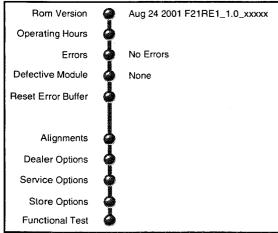
- Software version of main processor.
- Operational hours counter.
- Dealer options.
- Service options.
- Error buffer reading and erasing.
- Alignments.
- Functional test.

How to enter SAM

Use one of the following methods:

- Press the following key sequence on the remote control transmitter: 062596 directly followed by OSD (i+).
- Short jumpers 1 and 2 of connector 0356 on the SSP (the two pins that are nearest to the front panel).
- Use the "Align" key of the Dealer Service Tool (DST) emulation feature of ComPair.

After entering SAM, the following screen is visible:



CL 16532023_044.eps 21090

Figure 5-1 SAM screen shot

- **OPERATION HOURS.** The accumulated total of operation hours of the Receiver box. Every time the Receiver box is switched "on", 0.5 hour is added to the operation hours counter.
- HARDWARE INFO. Indicates the software date and version (MMMDDYYYY AAAABC_X.Y_xxxxx) of the box.
 - MMMDDYYY = software date
 - AAAA = the chassis name.
 - B = the region (E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM or G= Global).
 - C = the language cluster (1= English).
 - X = the main software version number.
 - Y = the sub software version number.
 - xxxxx = the last five digits of the 12nc code.
- ERRORS. Room for a maximum of 10 errors. The most recent error is displayed at the upper left position. For an explanation of the errors, see the error code table in the "Error Codes" section.
- **DEFECTIVE MODULE.** The module that generates an error is displayed here. If there are multiple errors in the

- buffer that have not all been generated by a single module, there is probably another defect. In that situation, the message "Unknown" will then be displayed here. If there are no errors, "None" is displayed.
- RESET ERROR BUFFER. Erases the contents of the error buffer. Press "OK" on the remote control transmitter to do this; the error buffer is cleared.
- ALIGNMENTS. Navigation by sub menus to service alignment items. The details of these alignments are explained in the "Electrical Alignments" section.
- **DEALER OPTIONS.** Controls the demonstration modes used by dealers for display purposes.
- SERVICE OPTIONS. In this sub menu, the options can be set. The quickest method to do this is through HW option number entry.
- STORE OPTIONS. Service options must be stored here. Note: Without storing, no changes made to the options will be recorded. The servicer must remember to store all changes before exiting SAM for those changes to take effect.
- FUNCTIONAL TEST. Activate this test by pressing the "OK" key on the remote control transmitter. Eventual errors are displayed in the error buffer. The error buffer is not erased, although it looks that way. By exiting SAM and then entering SAM again, you will see the error buffer still contains the previous contents.

How to navigate in SAM

Use one of the following methods:

- In SAM, select menu items with the "Cursor Up/Down" keys on the remote control transmitter. The selected "ball" item is highlighted and becomes a "puck" (blue becomes yellow). When not all menu items fit on the screen, this is shown by two "ball" figures overlapping. Use the " Cursor Up/Down " keys to display the next / previous menu item(s).
- With the "Cursor Left/Right" keys, it is possible to:
 - (De)activate the selected menu item.
 - Change the parameter of the selected menu item (some times through a "slider" entry)
 - Activate the selected submenu.
- To toggle to the SDM mode, press the following key sequence on the remote control transmitter: 062596 directly followed by MENU.

Note: SAM is exited when the MENU button on the remote control transmitter is pressed once. If SAM is exited accidentally, you have to enter the SAM mode again to perform SAM alignments and adjustments.

How to exit SAM

To exit SAM, press the MENU button on the remote control transmitter once

5.2.3 Customer Service Mode (CSM)

The Customer Service Mode shows error codes and information on the Flat TV operation settings. The servicer can instruct the customer to enter CSM by telephone and read off the information displayed. This helps the servicer to diagnose problems and failures in the Flat TV set before making a service call.

The CSM is a read-only mode; therefore, modifications are not possible in this mode.

How to enter CSM

To enter CSM, use one of the following methods:

- Press the MUTE button on the remote control transmitter and the MENU button on the local keyboard simultaneously for at least four seconds.
- An alternative CSM entry method is to press the following key sequence on the remote control transmitter: 123654.

Do not allow the display to time out between entries while keying the sequence. The disadvantage of this method is that the selected source is changed, due to the key sequence. Therefore, the first method is preferred.

Upon entering the Customer Service Mode, the following screen will appear:

Customer Service Menu 1

- SET TYPE. This allows the customer to view the (commercial) type number of the Receiver box, without looking at the bottom of this box. This information can be very helpful when talking with the service technician.
- AG NBR. First some explanation for understanding. On the type plate of the E-box (bottom), you can see a PROD. NO: AG-code (e.g. AG000312 xxxxxx): AG00 is a production code, 0312 means production year 2003, week 12 and xxxxxx is the series number of the set. On this screen line, you can read the AG-code of the Receiver box, without looking at the bottom of the E-box. This information can be very helpful when talking with a dealer or Philips Customer Care Centre (P3C). Currently this line is not filled in. At the moment, you will see: **0000.... It will be implemented in the future.
- SW VERSION. Indicates the software version (AAAABC_X.Y_xxxxx) of the box.
 - AAAA = the chassis name.
 - B = the region (E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM or G= Global).
 - C = the language cluster (1= English).
 - X = the main software version number.
 - Y = the sub software version number.
 - xxxxx = the last five digits of the 12nc code.
- FEATUREBOX. Gives the 12nc of the used Feature Box software.
- CODE 1. Gives the last five errors of the error buffer. As soon as the built-in diagnosis software has detected an error, the buffer is adapted. If there are no errors, the text "0" is displayed.
- CODE 2. Gives the first five errors of the error buffer. As soon as the built-in diagnosis software has detected an error, the buffer is adapted. The most recent error is displayed on the leftmost position of the Code 2 line. Each error code is displayed as a 3-digit number. When less than 10 errors occur, the rest of the line(s) is (are) empty. If there are no errors, the text "0" is displayed. See the "Error Codes" section for a description of the error codes. Service Tip: When a group of adjacent errors has a specific colour, this means they have occurred in the same time window. This gives service technicians additional information.
- VOLUME. Shows the last status of the volume, as set by the customer. The parameter can vary from 0 (minimum) to 100 (maximum). Volume parameters can be changed by using the volume key on the remote control transmitter.
 Note: For "speaker less" TV monitors, this item is not shown.
- BRIGHTNESS. Gives the last status of the brightness, as set by the customer. The parameter can vary from 0 (minimum) to 100 (maximum). The brightness parameter can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "picture" and setting "brightness".
- CONTRAST. Gives the last status of the contrast, as set by the customer. The parameter can vary from 0 (minimum) to 100 (maximum). Contrast parameters can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "picture" and setting "contrast".
- COLOUR. Gives the last status of the colour saturation, as set by the customer. The parameter can vary from 0 (minimum) to 100 (maximum). Colour parameters can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after

- pressing the "menu" button and navigating to "picture" and setting "colour".
- HUE. Gives the last status of the colour saturation, as set by the customer. The parameter can vary from -50 (minimum) to 50 (maximum). Hue parameters can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "picture" and setting "hue".

You can select the next Customer Service Mode screen(s) by pressing the CURSOR DOWN key on the remote control transmitter. To return to the previous Customer Service Mode screen(s), press the CURSOR UP key on the remote control transmitter (there are 4 CSM menu screens).

Customer Service Mode Screen 2

- SHARPNESS. Gives the sharpness parameter, as set by
 the user. It can vary from 0 (minimum) to 7 (maximum). A
 noisy picture may result if there is a bad antenna signal, or
 the parameter of sharpness is set too high. Sharpness
 parameters can be changed by using the CURSOR LEFT
 and CURSOR RIGHT keys on the remote control
 transmitter after pressing the "menu" button and navigating
 to "picture" and setting "sharpness".
- HEADPHONE VOLUME. Gives the last status of the headphone volume, as set by the customer. The parameter can vary from 0 (minimum) to 100 (maximum). Headphone volume parameters can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "sound" and setting "headphone volume".
- CENTRE MODE. Indicates the loudspeaker configuration of the monitor. If it is set to "On", then the internal speakers both produce centre sound (from the "centre input" input jack on the back of the set). If it is set to "Off", the speakers produce left and right sound. This parameter can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "Settings", "General" and choosing "Centre mode" = "On". Note: For "speaker less" TV monitors, this item is not shown.
- SOUND MODE. Indicates the selected sound mode, as selected by the customer. This can be "Stereo", or "Mono". This parameter can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "Settings", "General" and choosing "Sound mode".
- TUNER FREQUENCY. Gives the frequency of the main Tuner in MHz.
- INCREDIBLE SURROUND. Indicates the by the customer selected surround mode. This can be 'On' or 'Off'. Note: For "speaker less" TV monitors, this item is not shown.
- DIGITAL NATURAL. Indicates the, by the customer selected, Digital Natural Motion mode. This can be 'On' or 'Off'. This parameter can be changed via the 'cursor left' and 'cursor right' keys on the remote control handset after pressing the 'menu'-key and navigating to 'Menu', 'Picture' and choosing 'Dig natural motion'.
- TV SYSTEM. Gives information about the video system of the selected transmitter.
 - BG: PAL BG signal received
 - DK: PAL DK signal received
 - I: PAL I signal received
 - L/La: SECAM L/L' signals received
 - M38.9: NTSC M signal received with video carrier on 38.9 MHz
 - MN: NTSC M signal received

Customer Service Mode Screen 3

 BALANCE. Gives the last status of the balance, as set by the customer. The parameter can vary from -50 (maximum left balance) to 50 (maximum right balance). Balance parameters can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "sound" and setting "balance".

DNR. This is the setting of Dynamic Noise Reduction. This can be set to "Off", "minimum", "medium", or "maximum".

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NOISE FIGURE. Gives the selected noise ratio for the selected transmitter. This parameter can vary from 0 (good signal) to 255 (bad signal).

Note: This measured value only has significance when the "active control" mode is activated (this can be done by pressing the "active control" key on your remote control transmitter).

- SOURCE. This source parameter can be changed by using the CURSOR LEFT and CURSOR RIGHT keys on the remote control transmitter after pressing the "menu" button and navigating to "Menu", "Setup", and choosing "Source". The "quality" parameter depends how you connect your source: for example, if you connected the source to the Video input or to the SVHS input. This can be set to
 - Tuner (default)
 - EXT1.
 - EXT2.
 - EXT3.
 - EXT4.
 - EXT5.
 - Front.
 - VGA. Behind this source value there is an item referring to the "quality" of the chosen source:
 - Tuner (default)
 - VIDEO/STEREO.
 - VIDEO/NICAM.
 - S-VIDEO/STEREO.
 - S-VIDEO/NICAM.
 - RGB/STEREO.
 - YUV/STEREO.
 - YPBPR 1FH/STEREO.
- AUDIO SYSTEM. Gives information about the audio system of the selected transmitter.
 - Analog Mono.
 - Analog Stereo.
 - PCM 2/0.
 - DD: 1/0, 2/0 LtRt, 2/0 L0R0, 2/1, 2/2, 3/0, 3/1, 3/2, or
 - MPEG: 1/0, 2/0, 2/0 LtRt, 2/1, 2/2, 3/0, 3/1, 3/2, 1+1,
- TUNED BIT. Gives information about the tuning method of the stored preset.
 - If a channel is detected by searching (manual as well as automatic installation), the micro-search tuning algorithm is used. When a channel is identified and stored, this will display YES.
 - When you install a preset (while the channel is not being broadcast) with "digit entry"/"fine tune", the display (after storing) will read NO. If the channel is found later (after a successful micro-search), the tuned bit will change to "Yes". If the tuned bit displays "No", something is wrong with the installed preset. Please reinstall the preset.

Customer Service Mode 4

- ON TIMER. Gives information about the timer settings. This can be:
 - Off.
 - On.
 - Time (e.g. 18.25).
 - Day (e.g. Monday).
 - Program Number (e.g. PR23).
- PRESET LOCK. Gives the status info. This can be:
 - Unlock.
 - Locked.
- CHILD LOCK. Gives the status info. This can be:
 - Unlock.
 - Locked.
- Custom.
- AGE LOCK. Gives the status info. This can be:

- Off.
- 4, 6, 8, 10, 12, 14, or 16 years.
- LOCK AFTER. Gives the status info. This can be:
 - Off.
 - Time (e.g. 18.45).
- CATEGORY LOCK. Gives the status info. This can be:

 - Movies, News, Shows, Sports, Children, Music, or
- PROGRAM CATEGORY. Gives the status info. This can be:

 - Movies, News, Shows, Sports, Children, Music, or Culture.
- SW CODE 1. This code is only for Development. Do not
- SW CODE 2. This code is only for Development. Do not

5.3 Problems and Solving Tips (Related to CSM)

5.3.1 **Picture Problems**

Note: The problems described below are related to the TV settings (customer settings). The procedures to change the parameters (or status) of the different settings are described.

Snowy/noisy picture

Check the NOISE FIGURE line. If the value is 127 or higher and is also high on other programs, check the aerial cable/ aerial system.

Picture too dark

- Press the "Smart Picture" button on the remote control transmitter. If the picture improves, increase the brightness value or increase the contrast value. The new value(s) are automatically stored for all TV channels.
- If the picture improves after entering CSM, increase the brightness value or increase the contrast value. The new value(s) are automatically stored for all TV channels.
- Check the BRIGHTNESS and CONTRAST lines. If the value of BRIGHTNESS is low (<15) or the value of CONTRAST is low (<15), increase the brightness value or increase the contrast value.

Picture too bright

- Press the "Smart Picture" button on the remote control transmitter. If the picture improves, reduce the brightness value or reduce the contrast value. The new value(s) are automatically stored for all TV channels.
- If the picture improves after entering CSM, reduce the brightness value or reduce the contrast value. The new value(s) are automatically stored for all TV channels.
- Check BRIGHTNESS and CONTRAST. If the value of BRIGHTNESS is high (>60) or the value of CONTRAST is high (>75), reduce the brightness value or increase the contrast value.

Fading picture

Digital scan effect. Check the DNR line. The status of DNR is a value between 0 and 100. There is no practical way to explain the significance of this value. If the picture is fading, adjustment of the DNR level may help. The DNR level can be adjusted by the following navigation route: "Menu" - "Picture" - "DNR". There are four different selectable levels.

White line around picture elements and text

Press the "Smart Picture" button on the remote control transmitter. If the picture improves, reduce the sharpness value. The new value(s) are automatically stored for all TV channels.

- If the picture improves after entering CSM, reduce the sharpness value. The new value(s) are automatically stored for all TV channels.
- Check the SHARPNESS line. If the value is too high, reduce the sharpness value. The new value(s) are automatically stored for all TV channels.

Black picture and/or unstable picture

Improper signal is being received. Check the NOISE FIGURE line. If the value is higher then 127, the signal is suspect. Check your cable or aerial signal.

Black and white picture

Check the COLOUR line. If this value is low (<30), increase the "Colour" value. The new value(s) are automatically stored for all TV channels.

Menu text not sharp enough

- Press the "Smart Picture" button on the remote control transmitter. If the picture improves, reduce the contrast value. The new value(s) are automatically stored for all TV channels.
- If the picture improves after entering CSM, reduce the contrast value. The new value(s) are automatically stored for all TV channels.
- Check the CONTRAST line. If this value is high (>75), reduce the contrast value.

5.3.2 Sound problems (only with 'speakered' FTV-monitor connected)

No sound from left and right speaker.

Possible solutions:

- Press the "Smart Sound" button on the remote control transmitter. If the sound improves, raise the volume value. The new value(s) are automatically stored for all TV channels.
- If the volume is acceptable after entering CSM, increase the volume. The new value(s) are automatically stored for all TV channels.
- Check the VOLUME line. If the value is low, increase the "Volume" value. The new value(s) are automatically stored for all TV channels.

Sound too loud from left and right speaker.

- Press the "Smart Sound" button on the remote control transmitter. If the sound improves, reduce the volume value. The new value(s) are automatically stored for all TV channels.
- If the volume is acceptable after entering CSM, decrease the volume. The new value(s) are automatically stored for all TV channels.
- Check the VOLUME line. If the value is high, reduce the "Volume" value. The new value(s) are automatically stored for all TV channels.

5.4 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development of the DST (special remote control transmitter for service), which allows faster and more accurate diagnostics. ComPair has three big advantages:

ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.

ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself because ComPair takes care of this. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force electronic manual of the chassis being serviced, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the product. The ComPair interface box is connected to the PC via a serial or RS232 cable.

With the F21R Receiver box, the ComPair interface box and the Receiver box communicate via a bi-directional infrared link.

The ComPair faultfinding program is able to detect and diagnose problems occurring in the product. ComPair can gather diagnostic information in two ways:

- Automatic (by communication with the Receiver box):
 ComPair can automatically read out the contents of the
 entire error buffer. Diagnosis is done on I2C level. ComPair
 can access the I2C bus of the Receiver box. ComPair can
 send and receive I2C commands to the microprocessor of
 the Receiver box. In this way, it is possible for ComPair to
 communicate (read and write) to devices on the I2C
 busses of the Receiver box.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the microprocessor of the Receiver box is working correctly, and only to a certain extent. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (for example, Does the screen give a picture? Click on the correct answer: YES / NO), and showing you examples (for example, Measure test point I7 and click on the oscillogram you see on the oscilloscope). The servicer can answer by clicking on a link (for example, text or a waveform picture) that will bring you to the next step in the faultfinding process.

By a combination of automatic diagnostics and an interactive question and answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some additional features like:

- · Uploading or downloading of presets.
- · Management of preset lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and the Force electronic service manual are installed, all the schematics and the PWBs of the product are available by clicking on the appropriate hyperlink.

Example: Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the SSP.

- Click on the "Panel" hyperlink to automatically show the PWB with a highlighted capacitor C2568.
- Click on the "Schematic" hyperlink to automatically show the electronic position of the highlighted capacitor.

5.4.3 How to Connect ComPair

- First, install the ComPair Browser software on your PC (read the installation instructions carefully).
- Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked "PC") of the ComPair interface.
- Connect the mains adapter to the supply connector (marked "POWER 9V DC") on the ComPair interface.
- 4. Switch the ComPair interface OFF.
- 5. Switch the Receiver box OFF (and remove the mains).
- Point the ComPair interface to the Service send-LED (behind the cover) on the front of the Receiver box.

7. Plug the mains adapter in an mains outlet and switch on the ComPair interface. The green and red LEDs light up together. The red LED turns off after approximately 1 second, while the green LED remains lit.

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Start the ComPair program and read the "introduction" chapter.

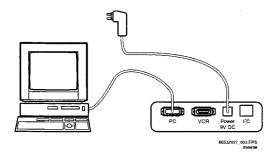


Figure 5-2 ComPair set-up

How to Order

ComPair order codes (EU/AP):

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631
- Starter kit ComPair32 software (registration version): 3122 785 60040
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070.
- SearchMan32 CD (update): 3122 785 60080.
- ComPair interface cable: 3122 785 90004.

Stepwise Start-up / Shut-down

Under normal circumstances, a fault in the power supply, or an error during start-up, will switch the television to protection mode. ComPair can take over the initialisation of the television. In this way, it is possible to distinguish which part of the startup routine (hence which circuitry) is causing the problem.

Stepwise start-up explanation

This is realised via ComPair and is very helpful when a protection is activated (see also paragraph "Protections").

Table 5-1 Stepwise Start-Up Table

State	Mode description	Display LEDs(*)	Enabled protections
0	Low power standbyuP in Standby.	Red 'on'	None
1	High power standby.TV-set in standby.	RedFlash 1 time	None
2	Supply 'on'.Protections 5V2 and 8V6 activated.	Orange/ GreenFlash 2 times	67 and 68
3	 Sound ICs initialised. Protections FBX and TUNER activated. 	Orange/ GreenFlash 3 times	Plus 77 and 80
4	Not used in FTV		
5	- TV operates. - Unblanked picture.	Orange/ GreenFlash 5 times	

Stepwise shutdown explanation

In the stepwise shutdown mode, state 2 and 4 are skipped.

Table 5-2 Stepwise Shut-Down Table

State	Mode description	Display LEDs(*)	Disabled protections
5	- TV operates. - Unblanked picture.	Orange/ GreenFlash 5 times	-
4	- All protections are 'on'.	Orange/ GreenFlash 4 times	-
3	- Sound ICs initialised. - All protections 'off'.	Orange/ GreenFlash 3 times	-
1	- High power standby. - TV-set in standby.	Red 0.5 Hz- Flash 1 time	80, 77, 68, and 67
0	- Low power standby. - uP in Standby.	Red 'on'	-

Note (*): When the set is in stepwise mode and, due to stepping-up, a protection is activated; the set will really go into protection (blinking LED). The set will not leave the stepwisemode however. By stepping down, the set can be activated again, until state X where the protection was activated. At state (X-1) diagnostic measurements can be performed.

5.5 **Error Codes**

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is written at the left side and all other errors shift one position to the right.

How to Read the Error Buffer

It is possible to read out the error buffer in three ways:

- On the screen while in Service Alignment Mode (SAM). If there is a picture, this is the easiest way to read the error buffer. In the SAM main menu, the last 10 error codes, which have occurred, are displayed. The most recently detected error code is displayed on the left side. Examples:
 - 003 000 000 000 000: error code 3 is the last and only detected error.
 - 002 003 000 000 000: error code 3 was detected first and error code 2 is the last detected (newest) error.
- With the CODE 1 and CODE 2 lines in CSM.
- With ComPair.

5.5.2 How to Clear the Error Buffer

It is possible to clear the error buffer in two ways:

- By selecting the item "reset Error Buffer" in the SAM main
- By pressing the following key sequence on the remote control transmitter: MUTE - 062599 - OK.

Note: When the error buffer is full (10 codes), no new errors can be stored. The set monitors how long every error is stored in the error buffer. If a false error is in the buffer, it will be deleted after 50 hours. If an actual error is in the error buffer, it will be written to the buffer again after 50 hours. This is a safeguard to ensure that the history of the error codes is stored. To help ensure that you are not reading false error codes, you may want to record the contents of the error buffer, reset the buffer, and see which error codes are generated again by the

5.5.3 Error Codes

If the set has non-intermittent faults, clear the error buffer before you begin the repair. This to ensure that old error codes are no longer present. If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause of the problem (for example, a fault in the protection detection circuitry can lead to a protection).

Table 5-3 Error Code Overview

Error	Device	Description	Defective item	Diagram	Defective module indication
2	ST24E32 or M24C32	Non volatile memory	IC7008	K7	Control
3	SAA580x	OTC2.5 microprocessor/TXT	IC7003	K7	Control
5	UV1316	Tuner	U1102	K1 .	Tuner
10	TEA6415	I/O source select video	IC7208	K8	Source select
11	TEA6422	I/O source select audio	IC7777	K8	Source select
15	TDA9320	HIP I/O-video processing	IC7501	K1	Chroma IF IO
20	TDA9330	HOP video control/deflection proc- essor	IC7300	K6	Video Controller
21	TDA9178 (if present)	LTP Peaking (TOPIC)	IC7402	K6	Video Controller
23	UPD64083 (if present)	3D Comb IC	IC7023	C0	3D Comb Filter
25	MSP34xxx	ITT sound processor	IC7751	К3	Audio Module
27	PCF8574	I/O Expander	IC7880	AV8	AV-Interface
30	TEA6415	Video Selection Switch	IC7710	AV7	AV-Interface
31	TEA6422	Audio Selection Switch	IC7810	AV8	AV-Interface
33	ACEX-EPLD	HD signal/sync processing	IC7360	AV3	AV Interface
35	UV1316 (if present)	FDS Tuner	U1102	M1	Video Dual Screen Panel
36	PCF8574 (if present)	FDS I/O Expander	IC7860	M2	Video Dual Screen Panel
37	SAB9079 (if present)	FDS Popov	IC7700	M4	Video Dual Screen Panel
38	TDA9320 (if present)	FDS HIP2	IC7501	M1	Video Dual Screen Panel
39	M24C04 (if present)	FDS NVM	IC7991	M1	Video Dual Screen Panel
41	TDA7309 (if present)	FDS Headphone	IC7620	M5	Video Dual Screen Panel
50	SAA4978	FBX Picnic	IC7611	L1	Feature Box
52	T8F24EF (if present)	FBX Eagle	IC7724	L2	Feature Box
53	SAA4992	FBX Falconic	IC7626	L3	Feature Box
65	Slow I2C bus blocked		See block diagram	Slow I2C Blocked	70 1 11
66	Fast I2C bus blocked		See block diagram	Fast I2C Blocked	
67	Supply 5V	5V2	See block diagram	+5V Supply	
68	Supply 8V	8V6	See block diagram	+8V Supply	
77	Featurebox protection	FBX prot.			+3V FBX Supply
80	Tuner protection	Tuner prot.	U1102	K1	+8V Tuner Supply
81	UPD64083 (if present)	3D Comb prot.	IC7023	C0	3D Comb Filter

5.6 Protections

The microprocessor (OTC) of the F21R Receiver box remains active during standby. This because power of the microprocessor (and the attached memory chip set) is coming from the 3V3 supply, which is derived from the 5V Standby circuitry.

Therefore, in both "Power on" as in "Standby" mode, the microprocessor is connected to this power supply. The microprocessor controls the "Standby" line for switching "on" and "off" the main supply. In the standby mode, or in the protection mode, the "Standby" line will open the contacts of relay 1400 (diagram PS) via T7401, which results in switching "off" the mains input to the main supply.

We can divide the chassis protections in two groups:

 I2C protections: from I2C-busses (fast and slow) or I2C-IC errors (device errors).

2. OTC input protections.

5.6.1 I2C Protections

During normal operation, some registers of the I2C controlled ICs are refreshed every 200 milliseconds. During this sequence, the three I2C busses and the I2C ICs will also be checked.

Possible protections:

- I2C bus protections. This will take place if the SDA and SCL are short-circuited to ground or to each other.
- I2C device protections. This can occur when there is a malfunction in the communication with one specific device, or if the power supply of the device is missing.
- FBX and/or Tuner circuitry protection. If one of these circuits does not respond for more than 1 second

(measured via I2C), the Receiver box goes into protection

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5.6.2 **OTC Input Protections**

If a protection is detected at an input of the OTC, all protection inputs of the OTC will be scanned every 200 milliseconds five times. If the protection on one of the inputs is still activated after 1 second, then the set will go into protection mode.

Possible protections:

8V6 and 5V2 protection. The presence of the 8V6 and 5V2 is sensed by the OTC. If the 8V6 and/or 5V2 are/is not present, then an error code is stored in the error buffer.

5.7 Repair tips

5.7.1 How to Deal with a "TV configuration" Situation

It is not easy to access the CSM menu without the accompanying plasma monitor. Therefore, it is best to retrieve this information while you still have the complete configuration. Depending on the fault, the problem may be easily solved. However, if this is not the case, some of the data recorded could assist you in the repair.

5.7.2 How to Deal with a "Receiver Box Only" Situation

Without the accompanying plasma monitor, the Receiver box will go into Standby mode after a few seconds (this monitor detection is designed to prevent Philips Receiver boxes from being used with other brands of monitors).

This detection can be overridden in the following way (to use, for example, a PC monitor):

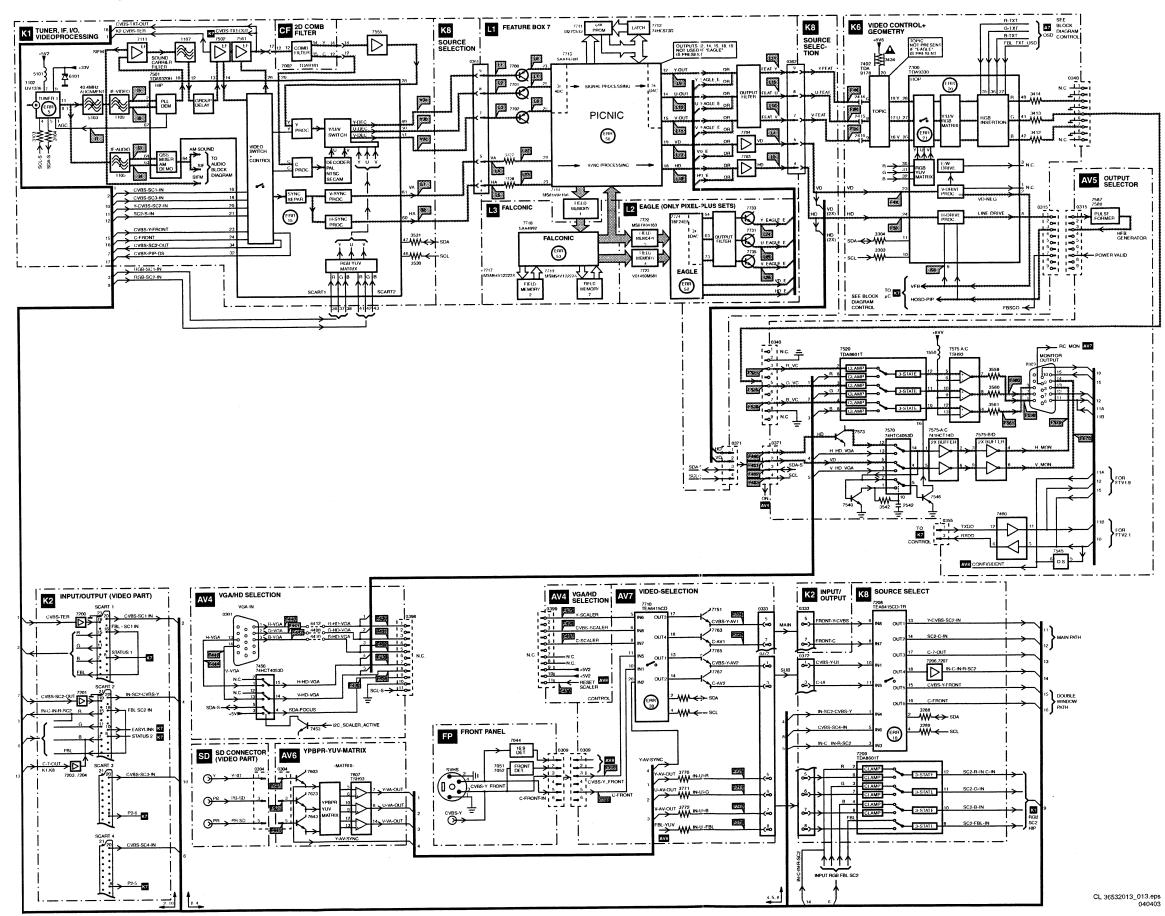
- Enter the SAM-mode via ComPair (using the "align" key of the DST simulation mode), or through the HW intervention of connector 0356 on the SSP (pins 2 and 3). The set will now operate in SDM. Then short pins 1 and 2 to enter SAM.
- Via navigation in the SAM menu and selecting, you must follow the this route: "Service Options" - "Miscellaneous" -"Stand-alone".
- Toggle "No" to "Yes" and store this change (this means that a bit is changed in the NVM).
- Now the Receiver box can operate with any monitor (for example, a PC monitor).
- The Service technician can now perform the diagnosis and repair (the CSM menu can also be accessed now).
- When the problem is solved, the Stand-alone option bit should be reset to "No", to return the set to the original setting.

5.7.3 Miscellaneous Tips/Remarks

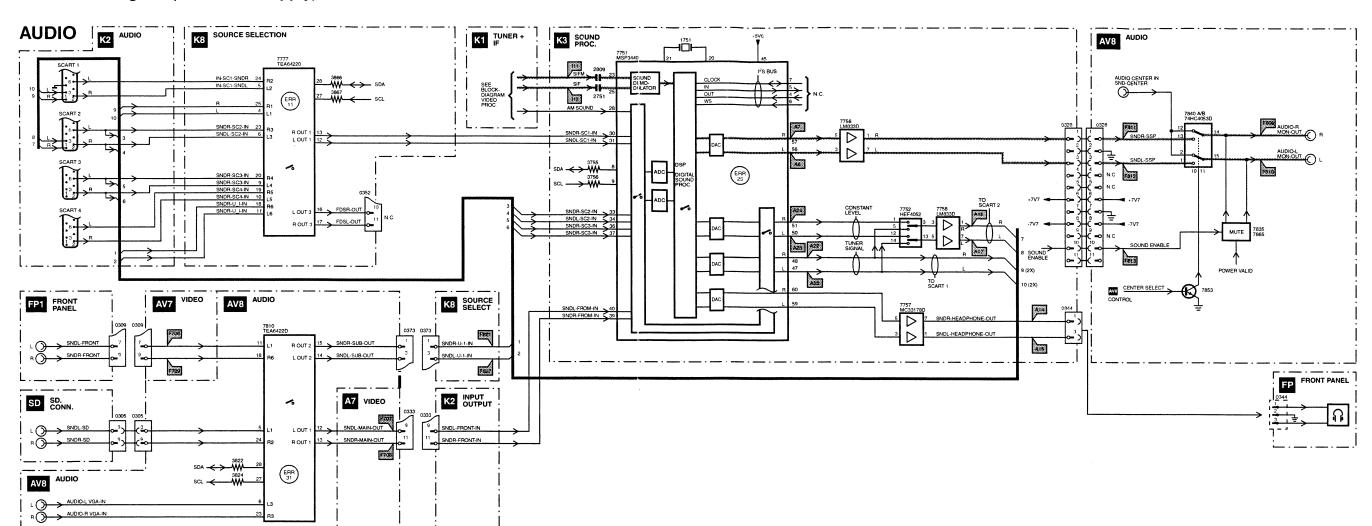
- Sometimes, when there is an NVM related error/problem and the set does not want to start up, it can be helpful to start the set without the NVM (IC7008 on the IC holder on the SSP). You can see OSD on the monitor, for a short time, so you can conclude that much of the circuitry is working fine.
- If an empty EAROM (permanent memory) is detected, all settings are set to pre-programmed default (standard) values.
- To overrule the childlock PIN code, use code "0711".
- When the user settings related to optimal picture and sound performance are in doubt, one can restore the default factory settings via: "Settings" - "General" - "Reset AV settings", and pressing the "OK" key on the remote control transmitter. This may help correct an incorrect user setting faster, since the starting point is more clearly defined (for example, the set will leave the factory with "DNR" on medium, "Dynamic Contrast" on medium, and "Sharpness" on 4, etc)..

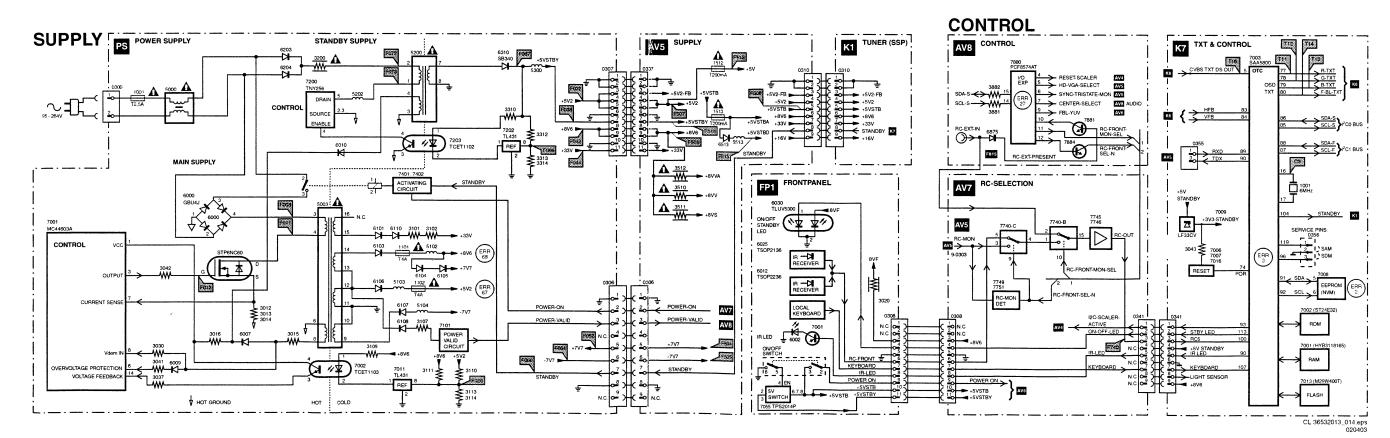
6. Block Diagrams, Testpoint Overviews and Waveforms

Block Diagram (Video)

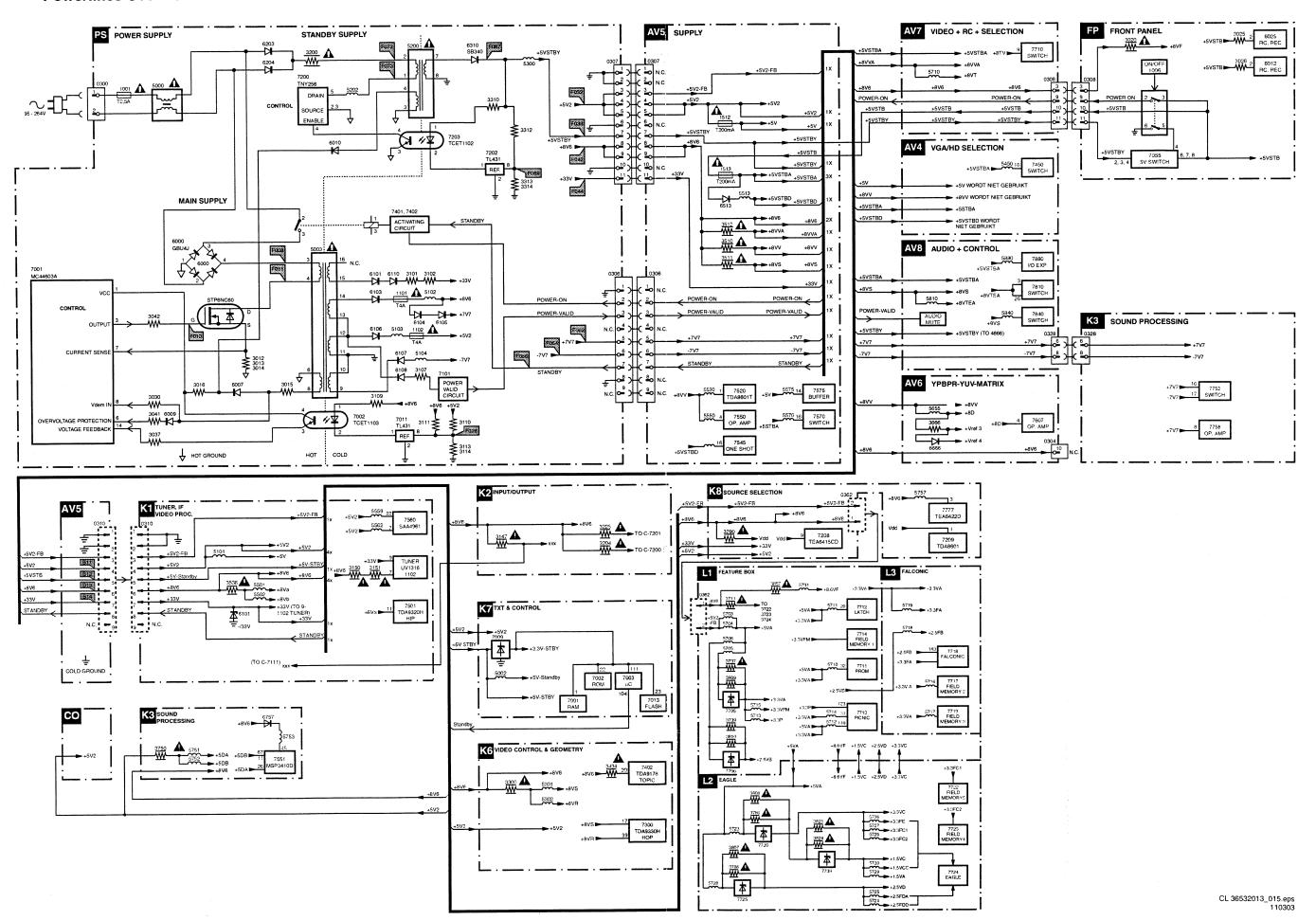


Block Diagram (Audio and Supply)

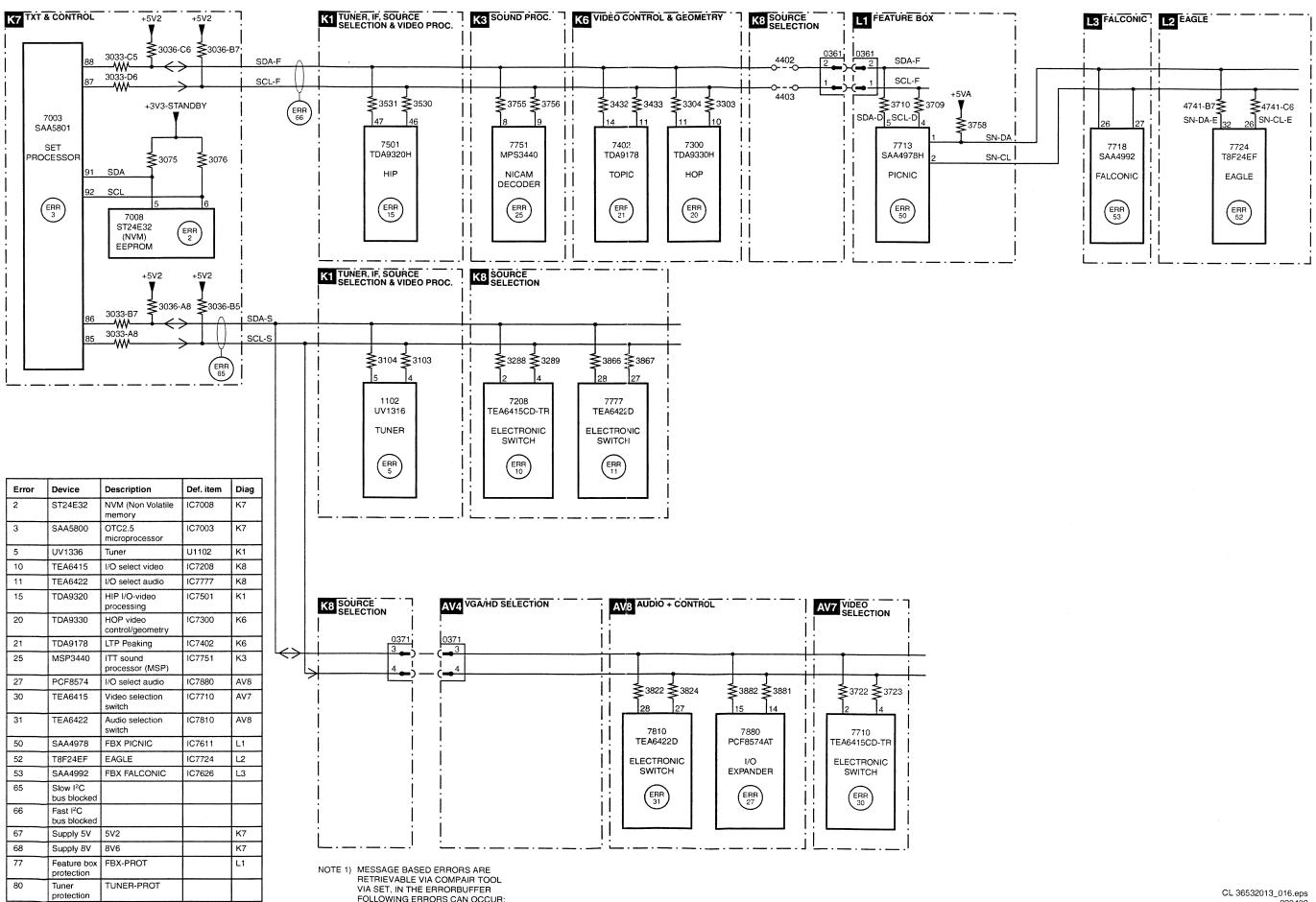




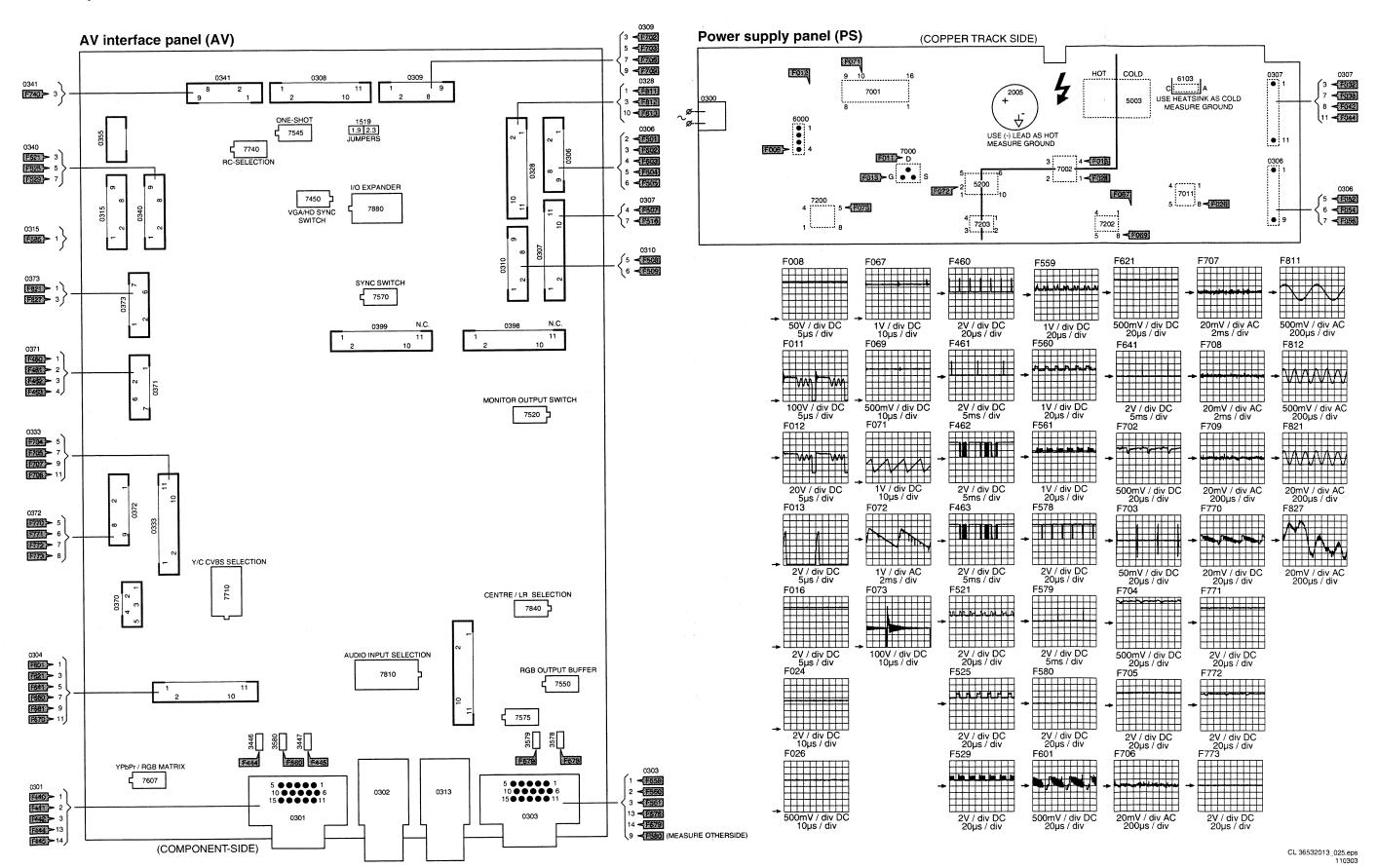
Powerlines Overview



I2C-IC's Overview

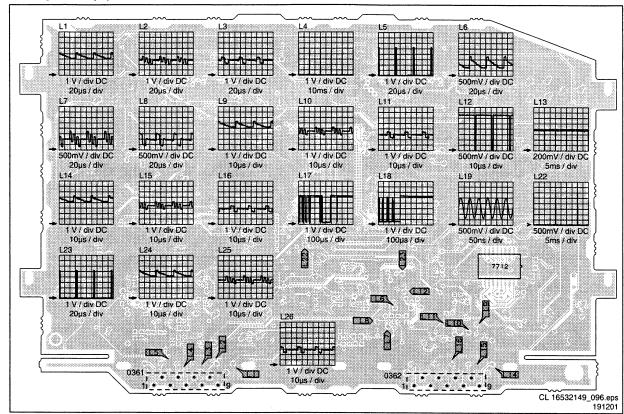


Testpoint Overviews (AV + PS)



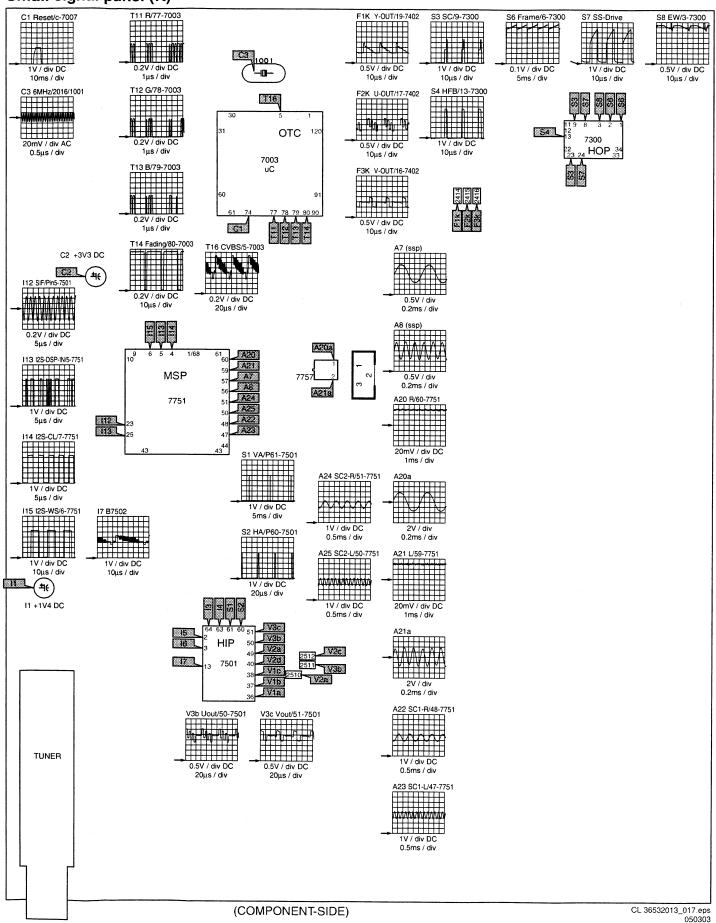
Testpoint Overviews (K + L + M)

FBX panel (L)

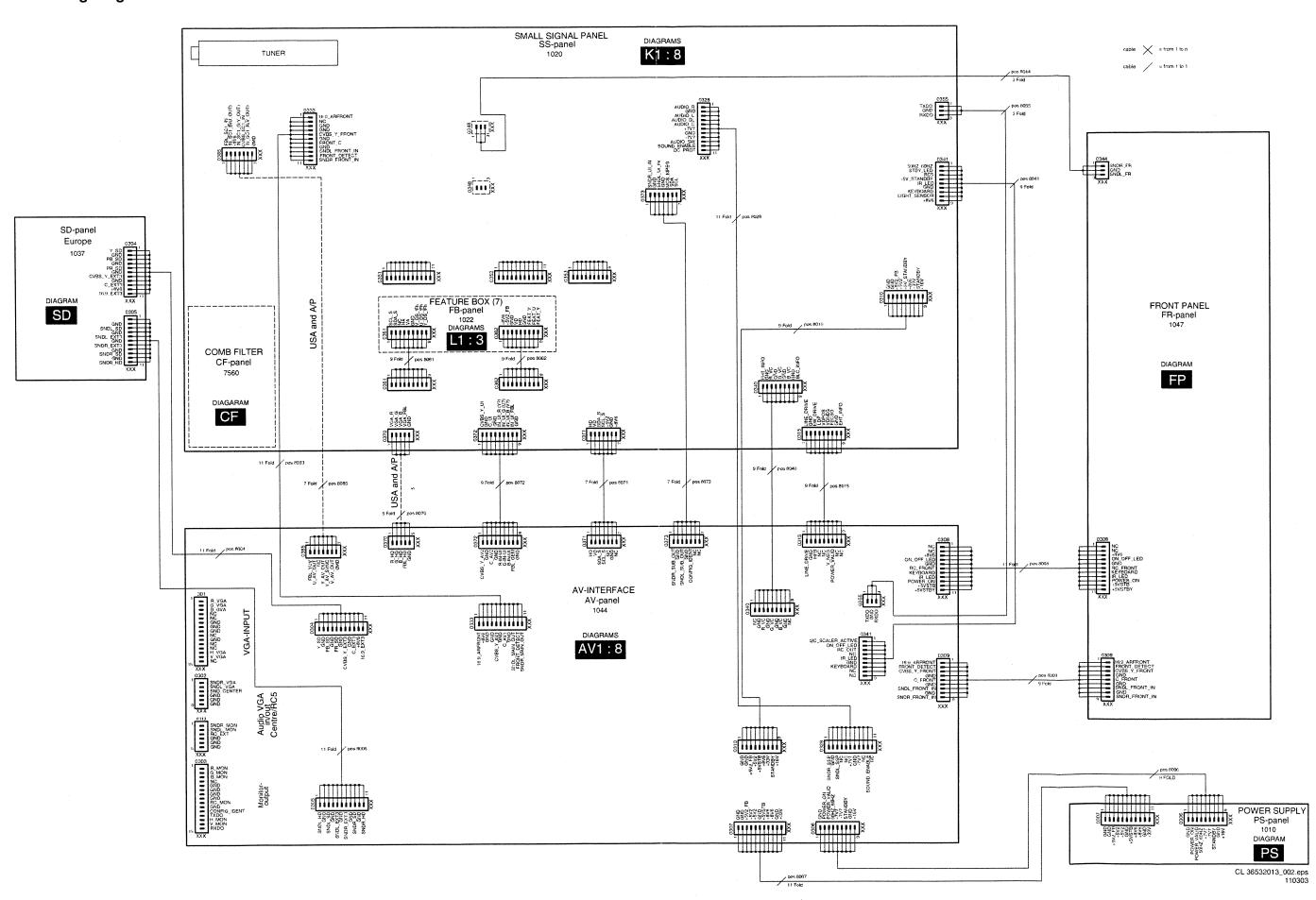


(COPPER-SIDE)

Small signal panel (K)

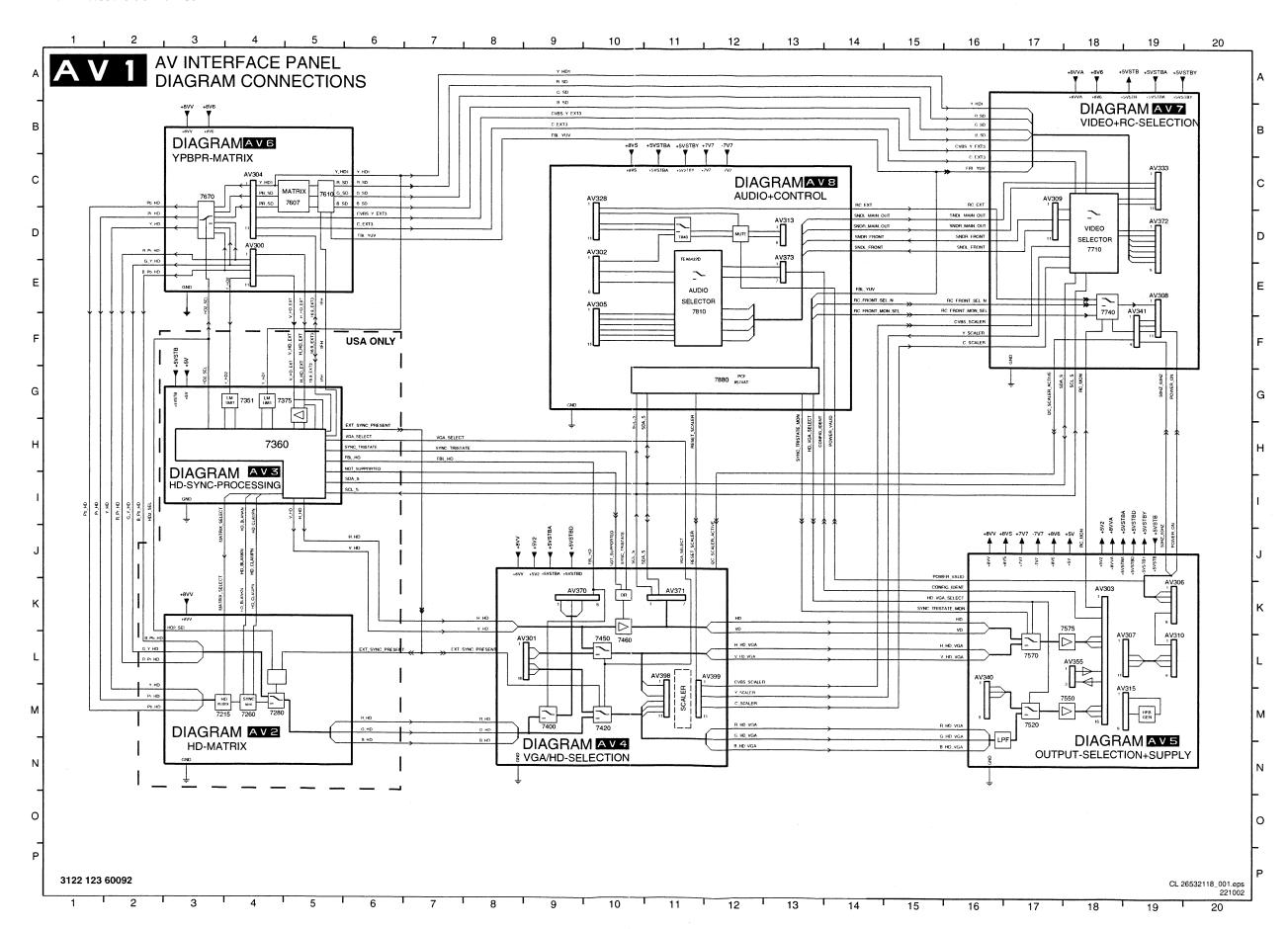


Wiring Diagram



7. Circuit Diagrams and PWB Layouts

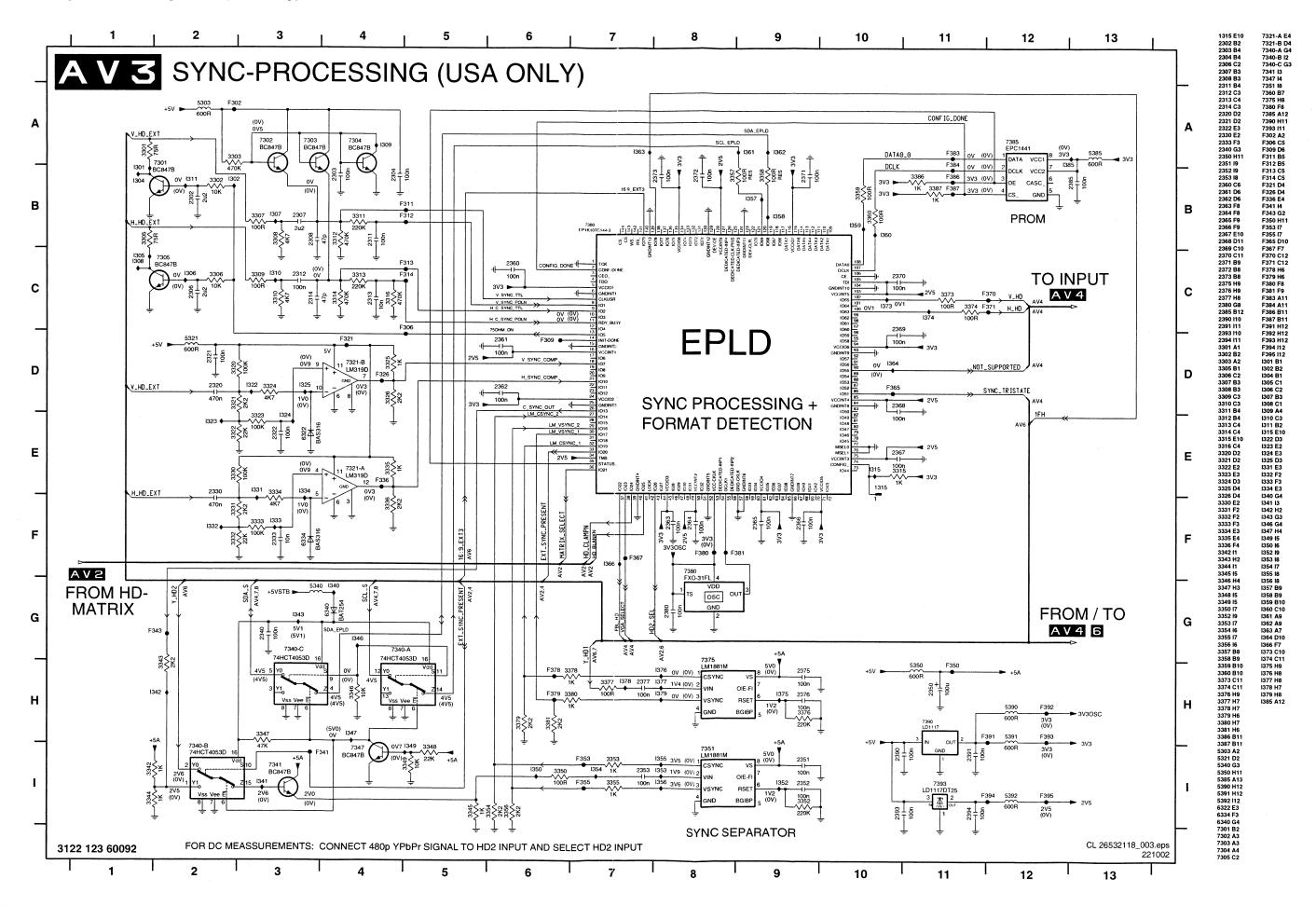
AV Interface Panel



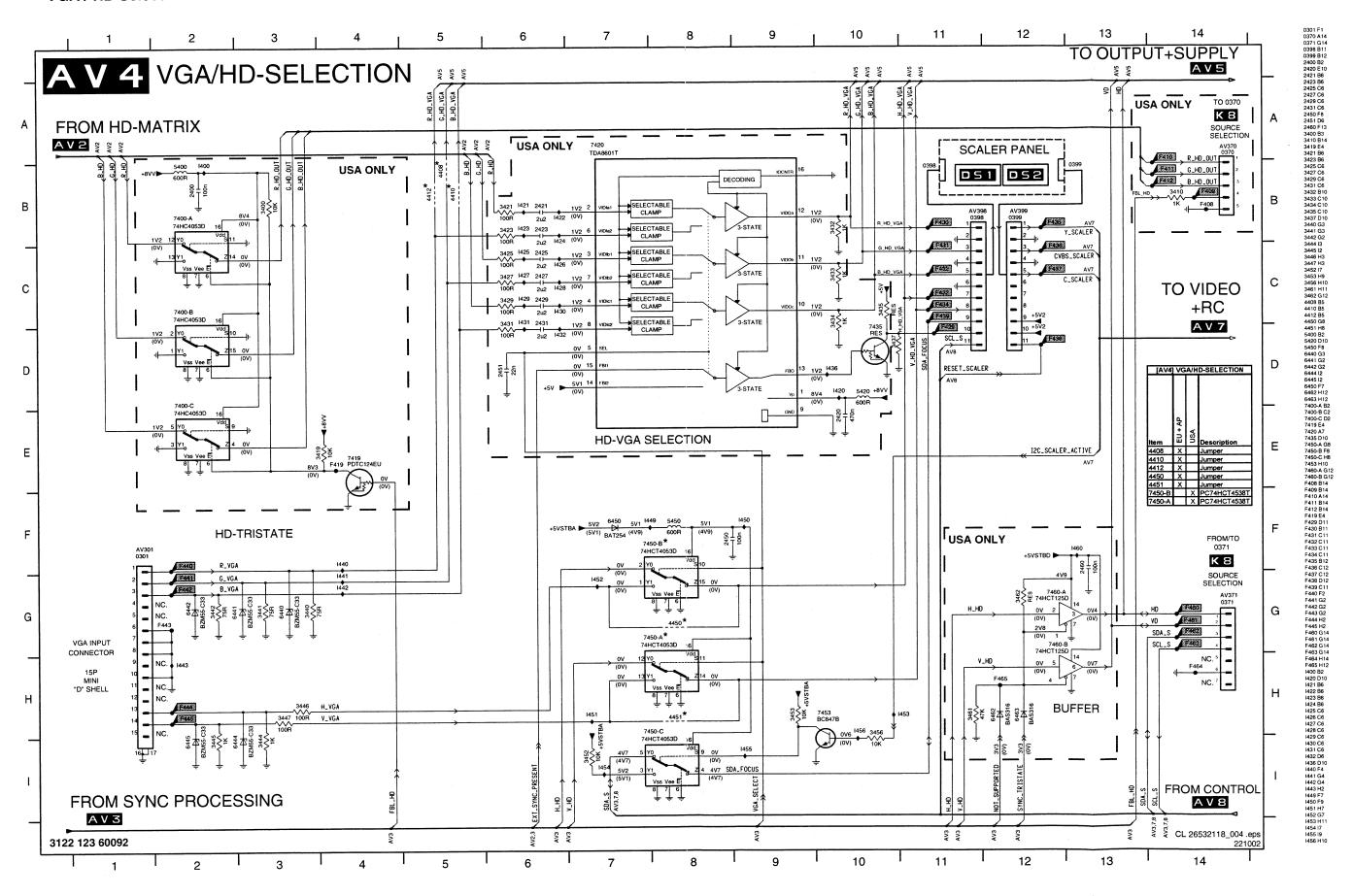
F21RE AB

Circuit Diagrams and PWB Layouts

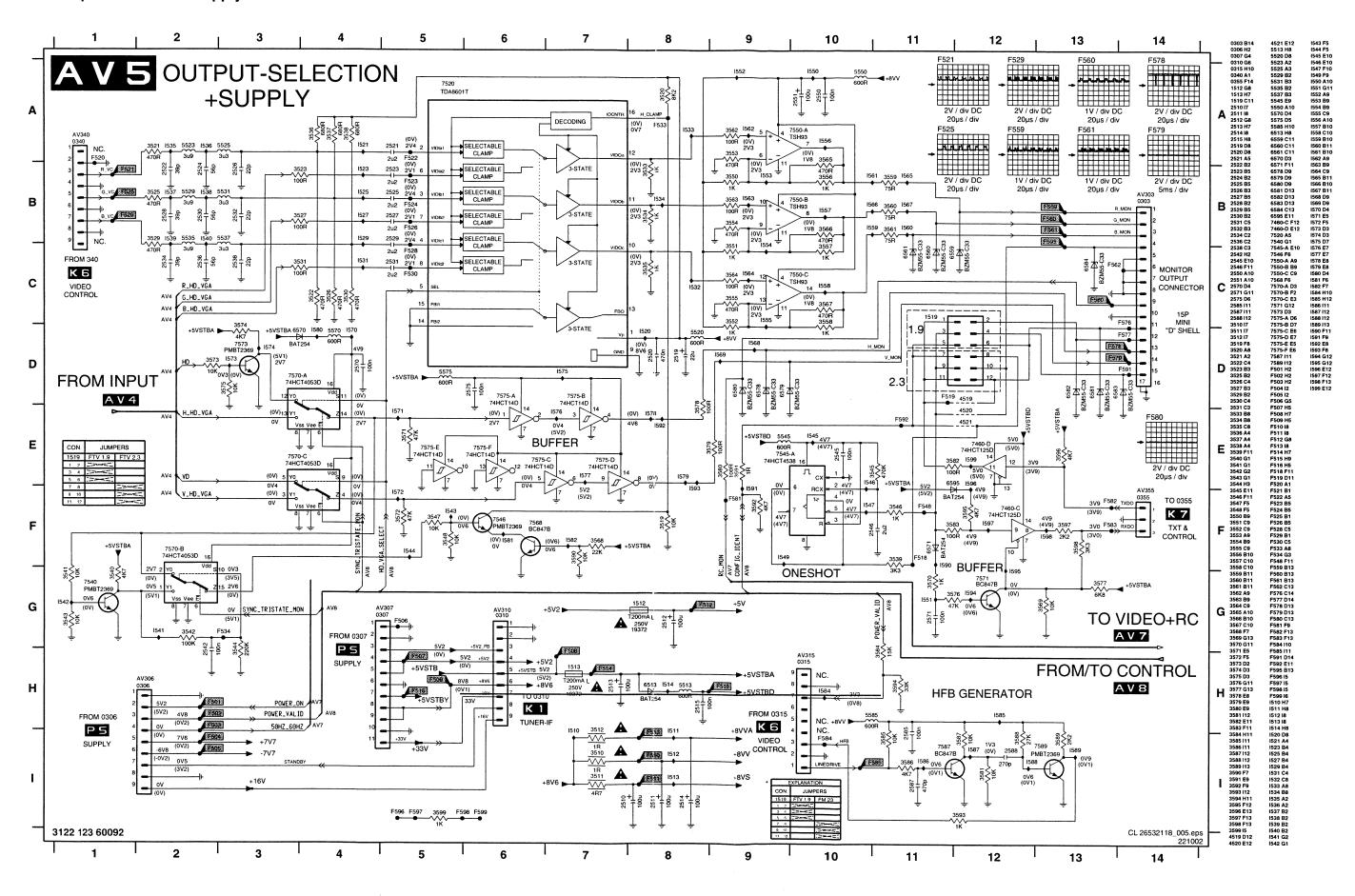
Sync Processing Panel (USA only)



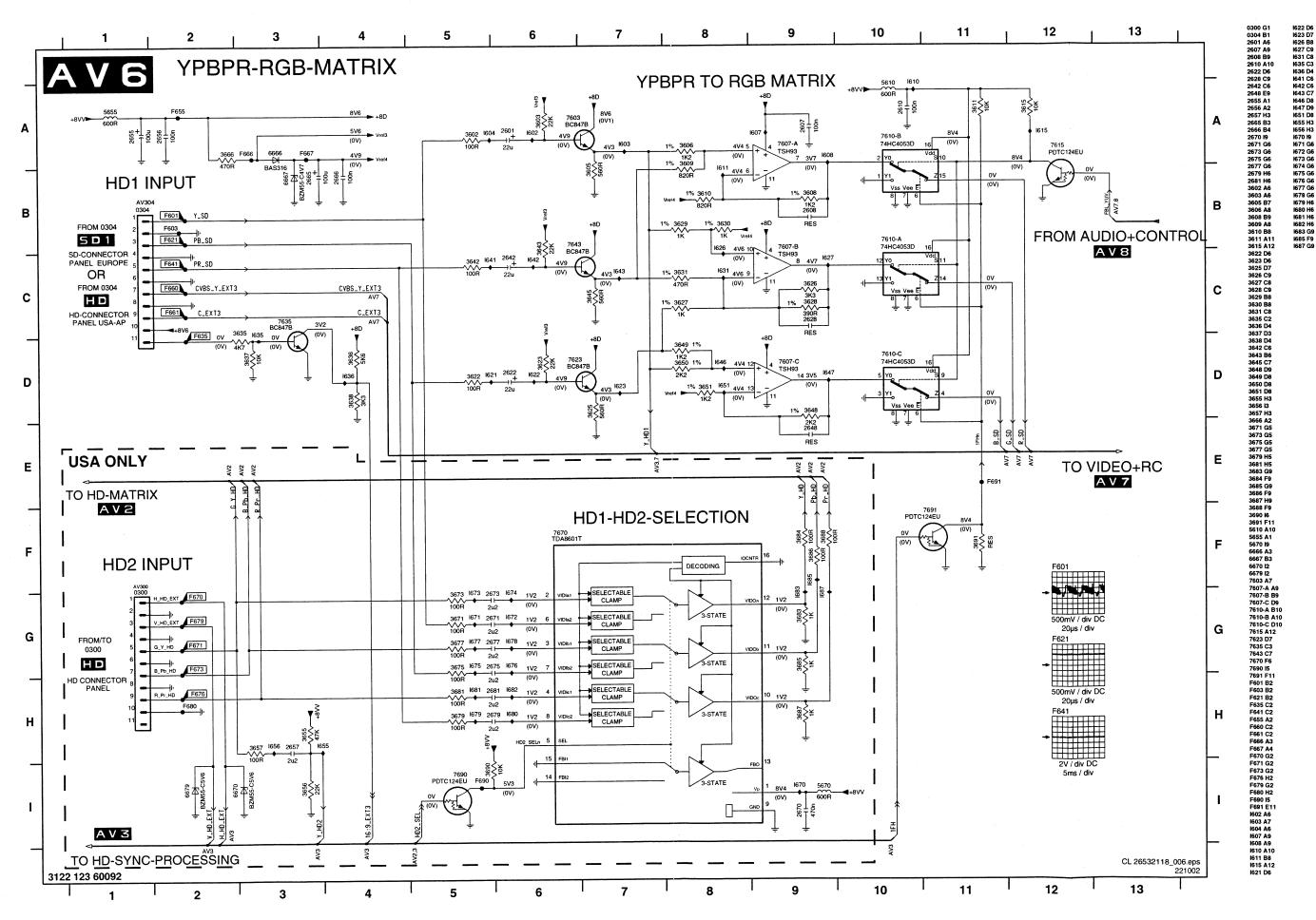
VGA / HD Selection Panel



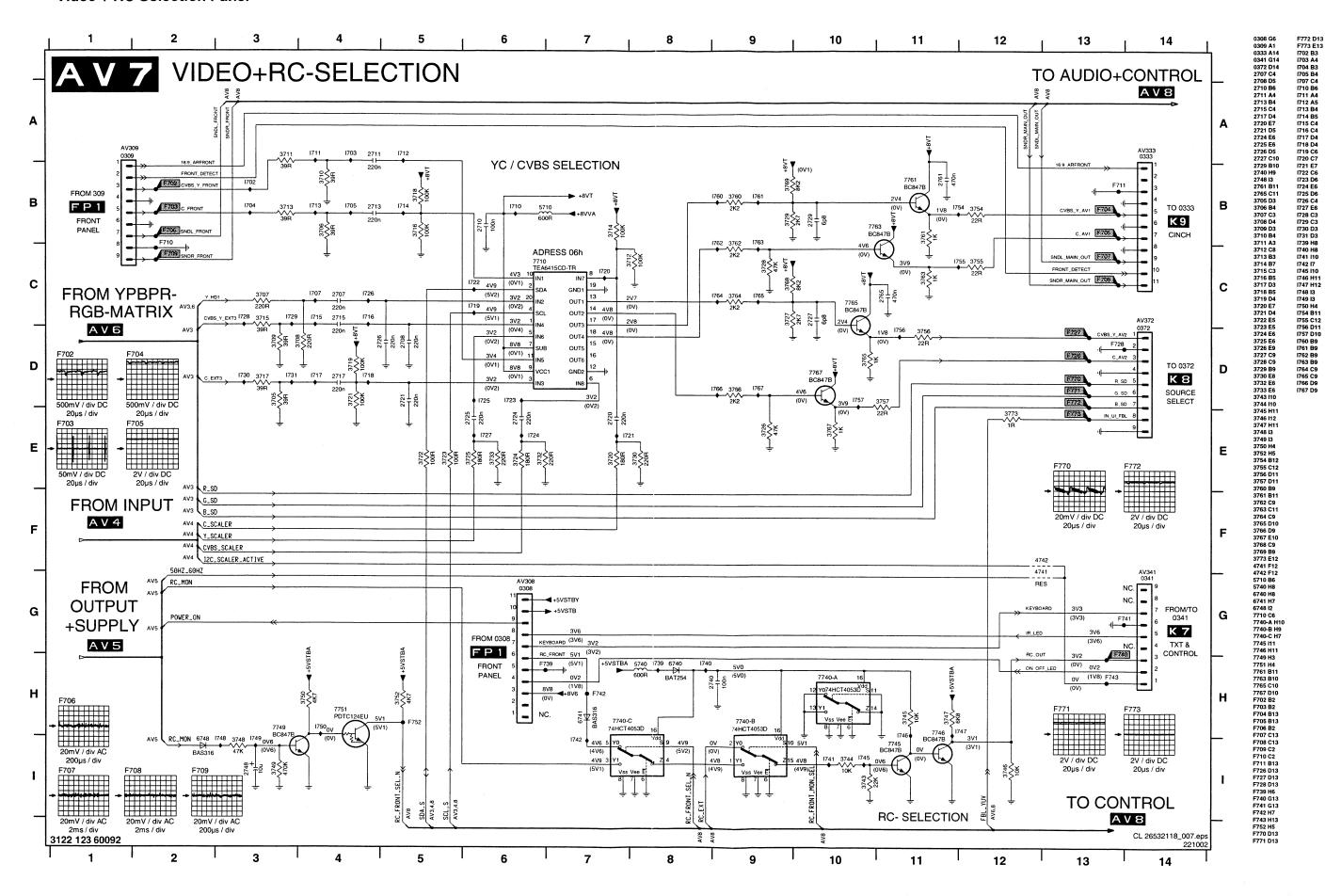
Output Selection + Supply Panel



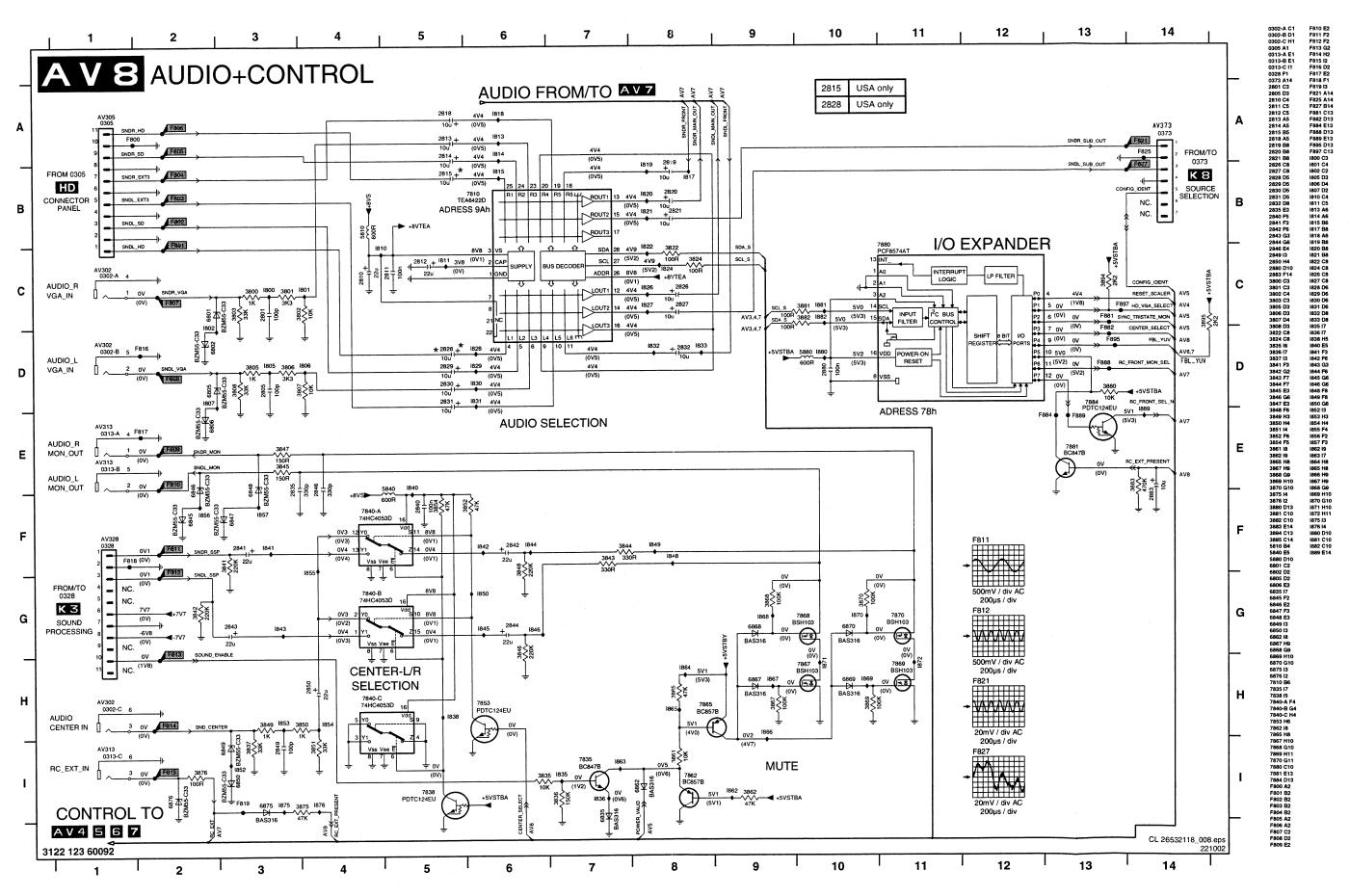
YPBPR RGB Matrix Panel



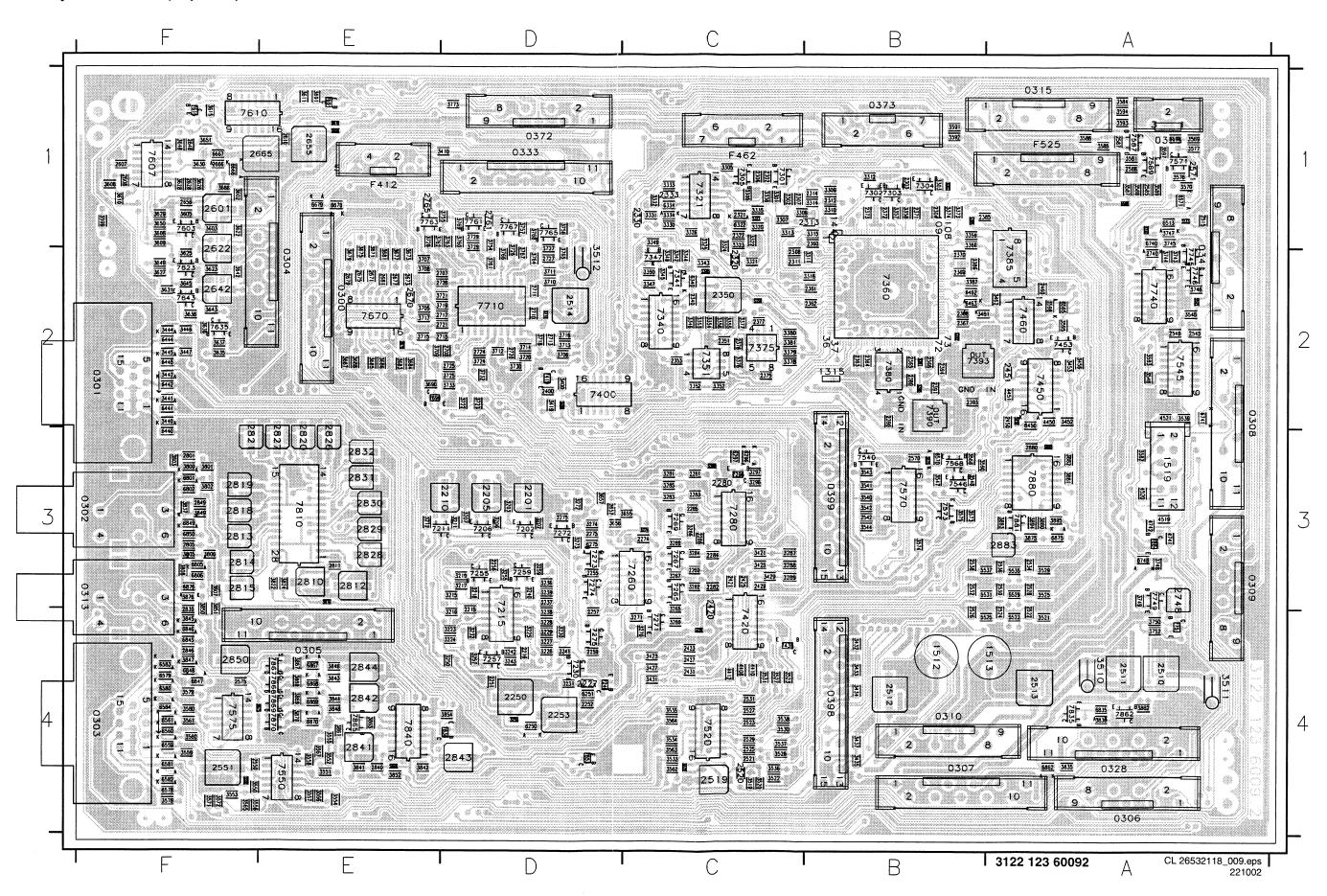
Video + RC Selection Panel



Audio + Control Panel



Layout AV Panel (Top Side)



F515 A3 F516 A2

F520 A4

F521 A4

F522 C1

F827 E3 F879 B3

F880 B3

F881 B1

F882 D1

1341 C3 1342 C3

1352 C3

1353 C3

1354 C3

1554 E1 1555 E1

1556 F1

1557 E1

1558 E1

Mapping Layout AV

Mapping Top Side								
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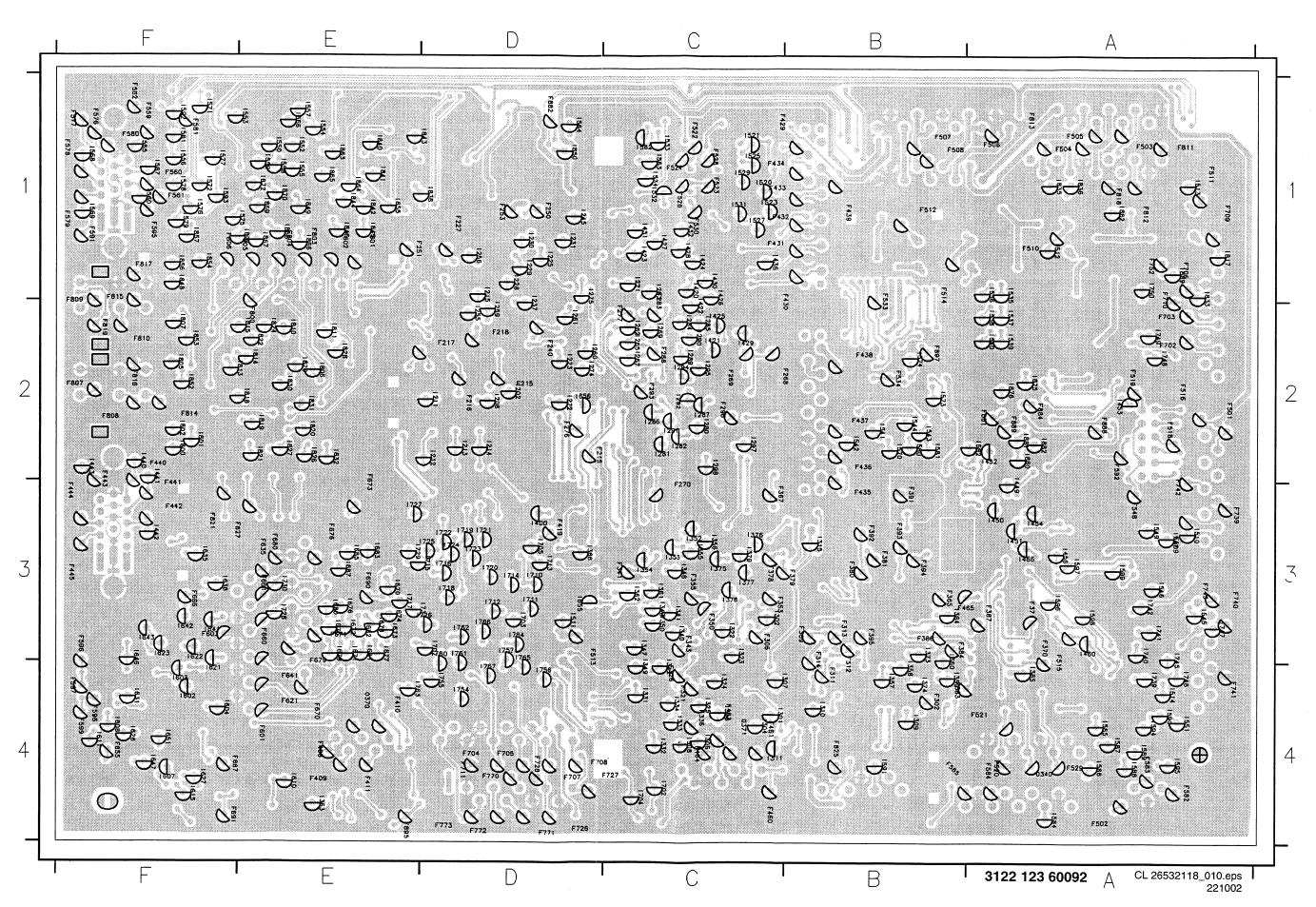
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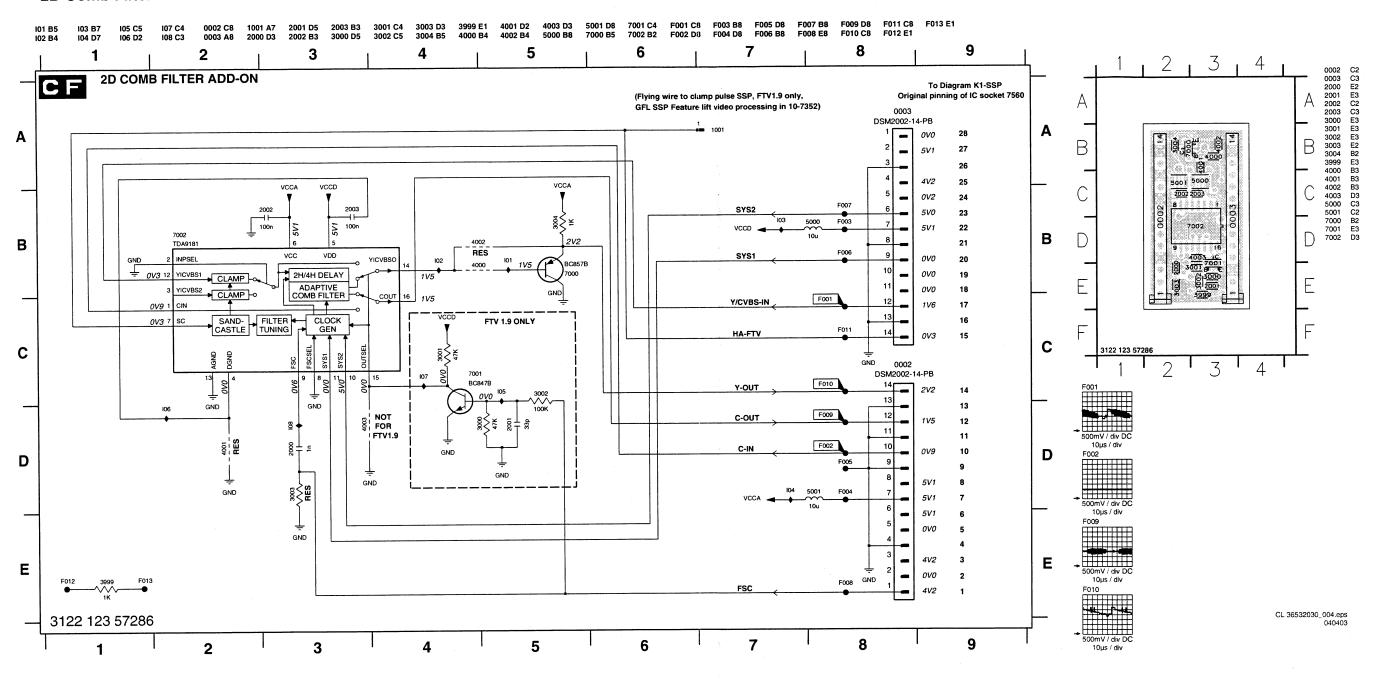
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1748 A2

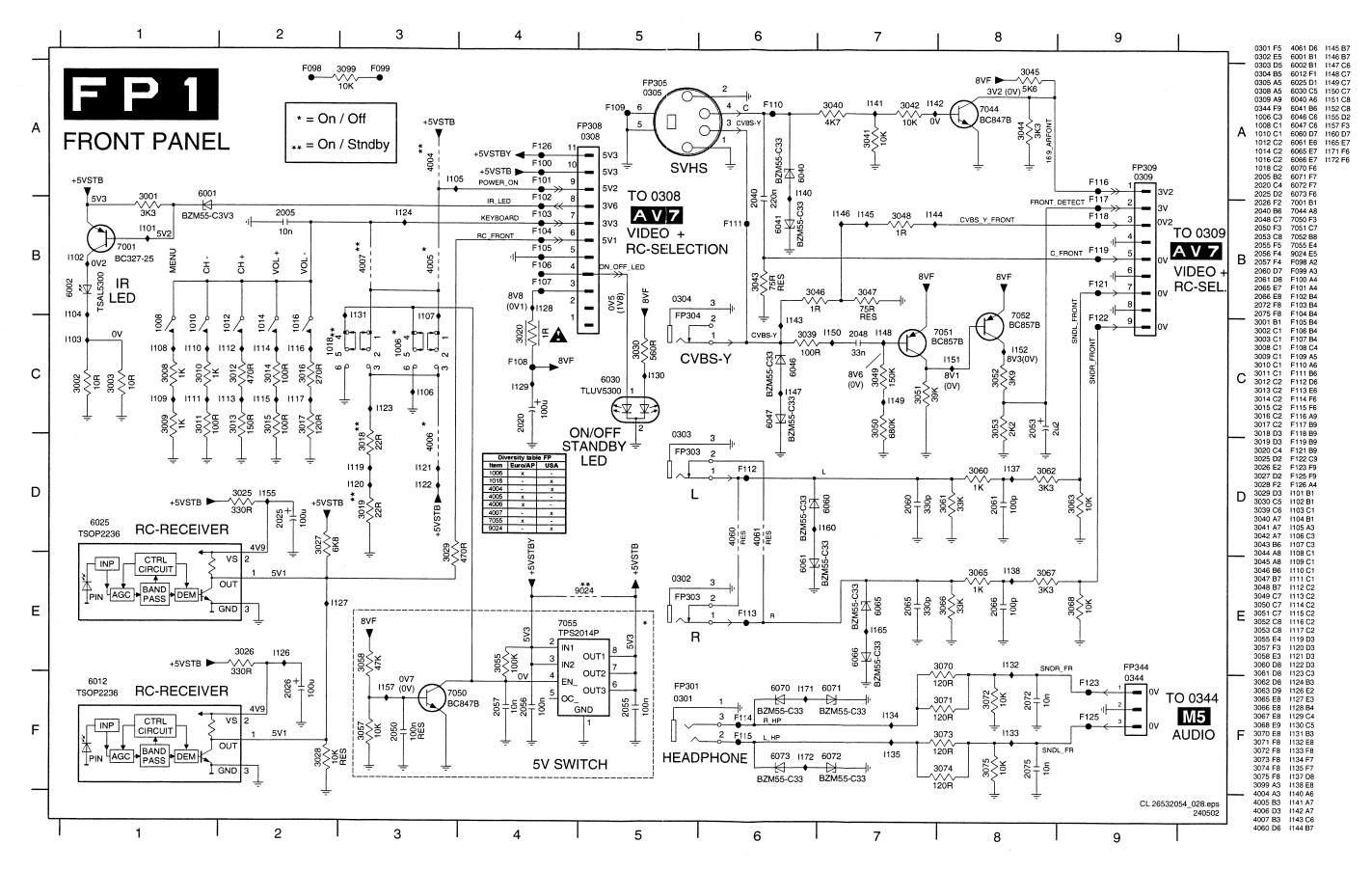
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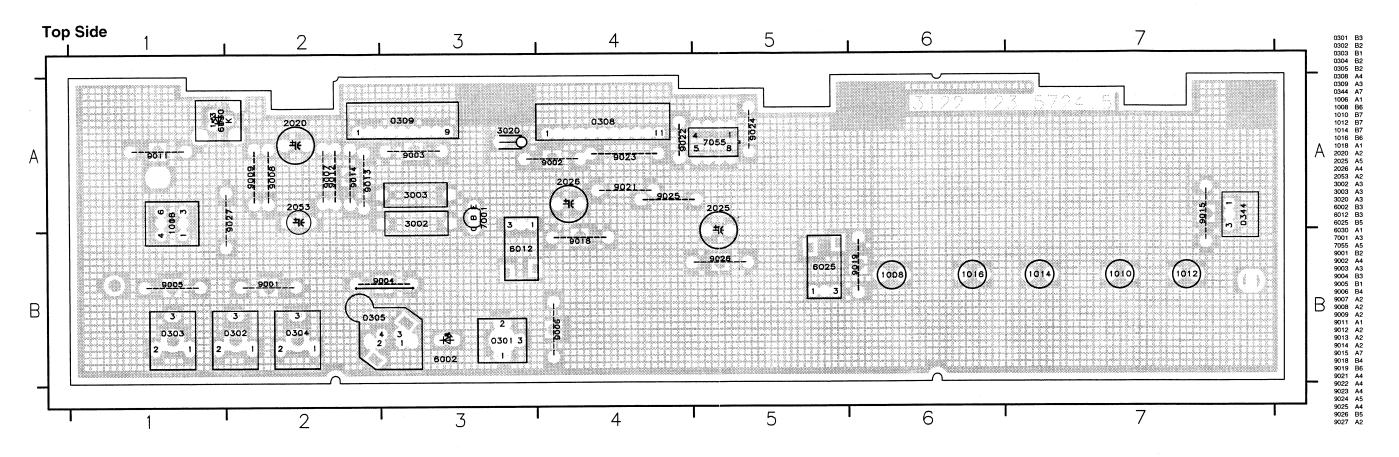
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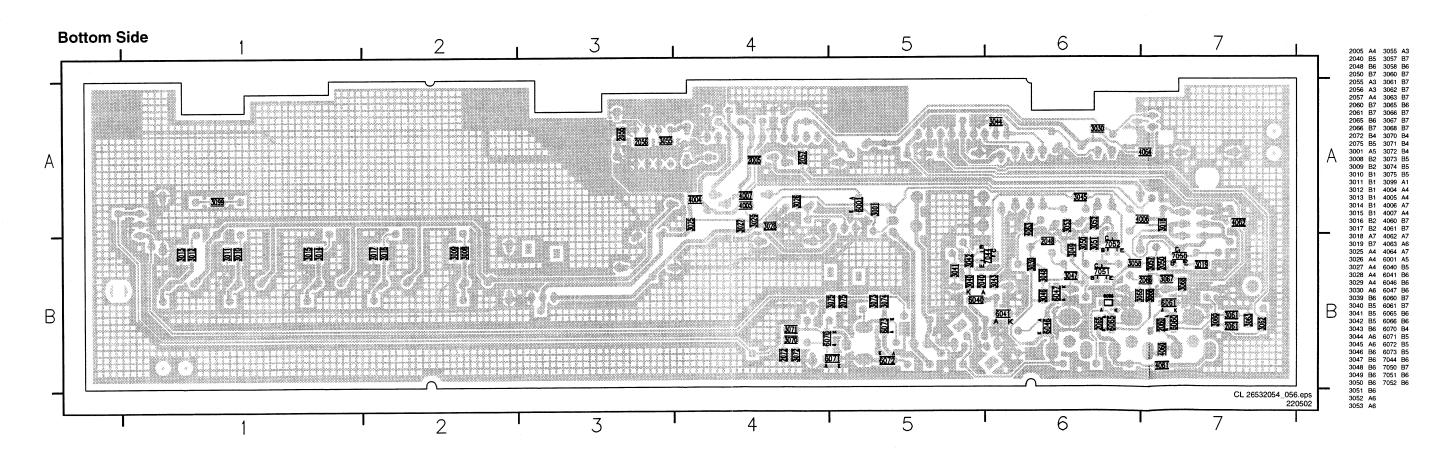


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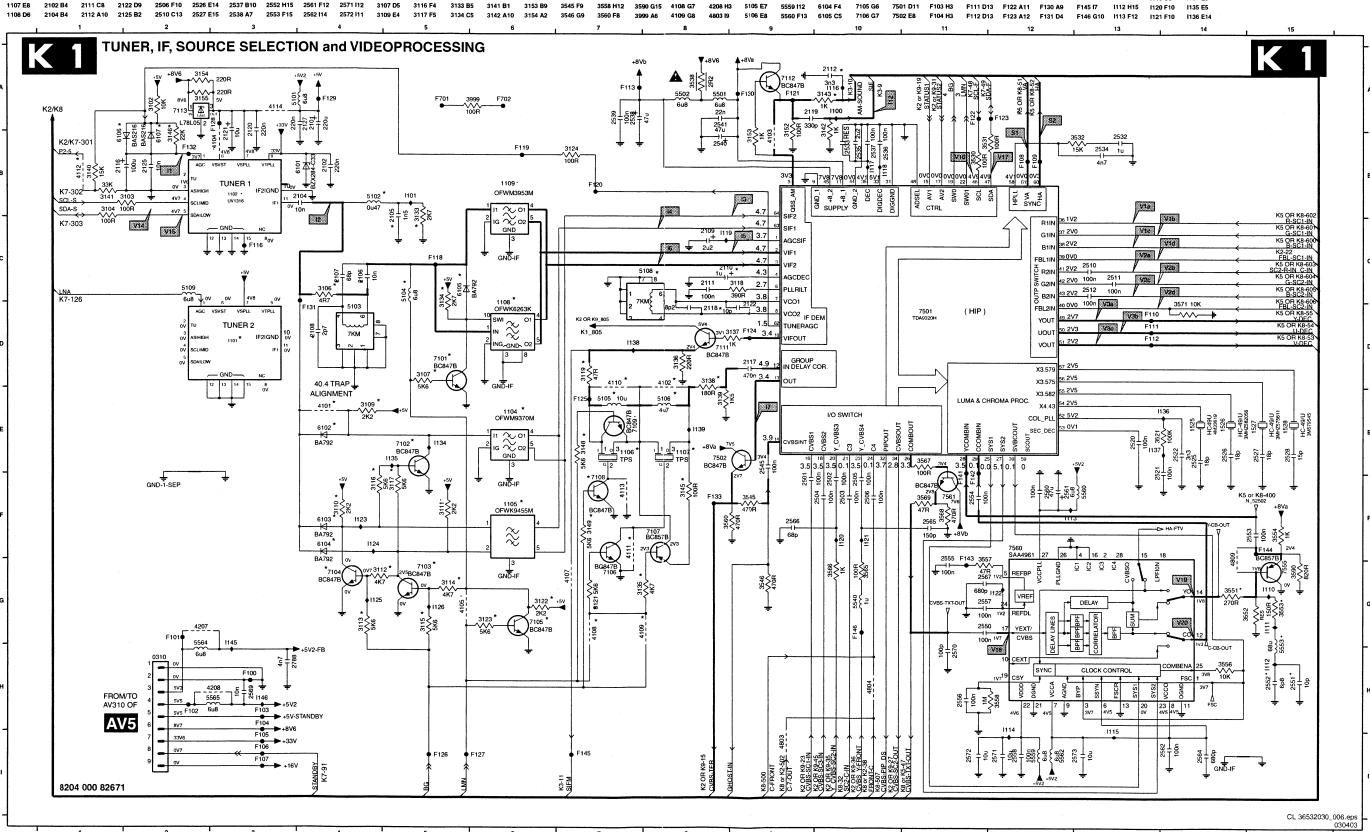
Layout Front Panel

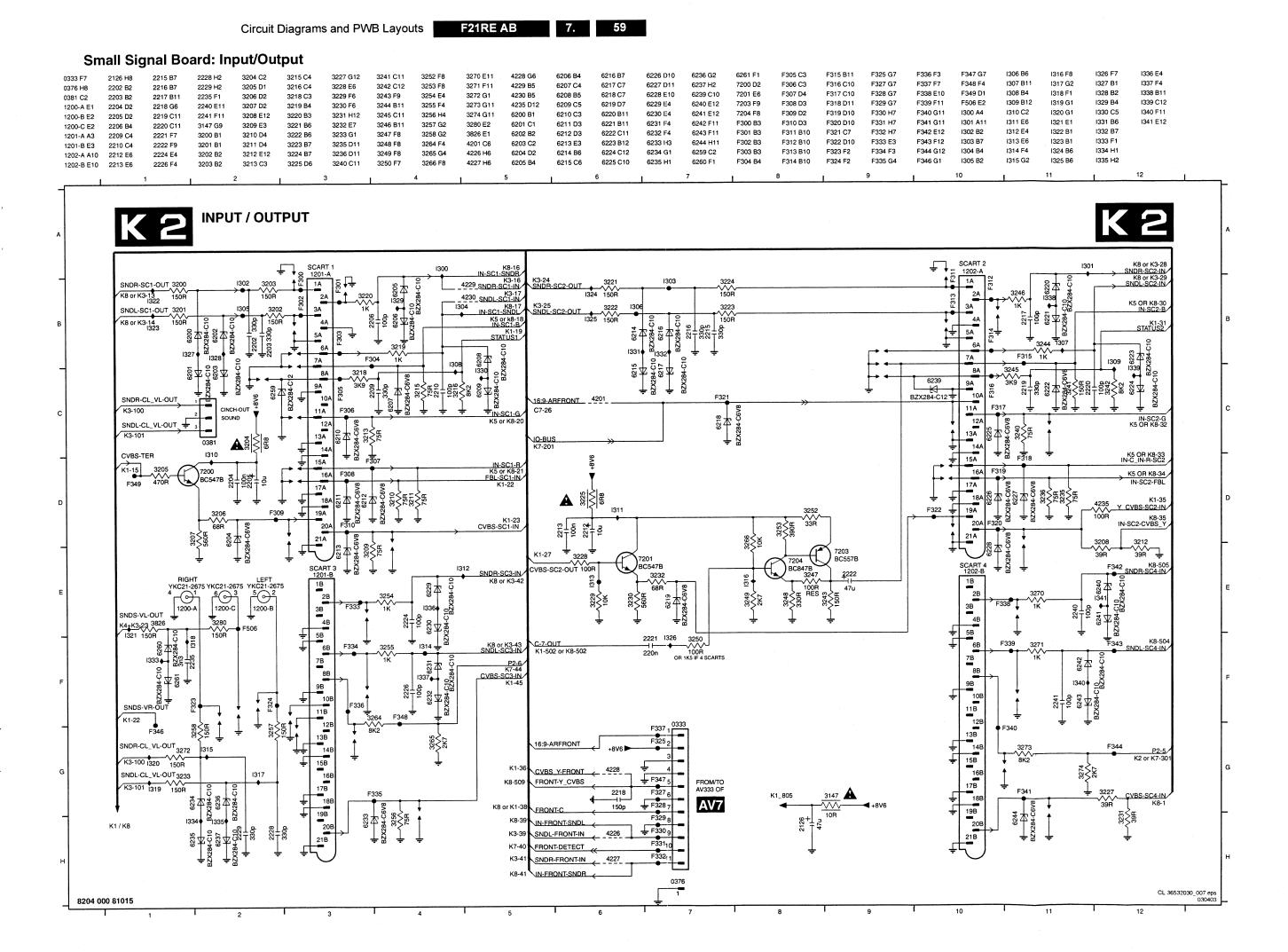




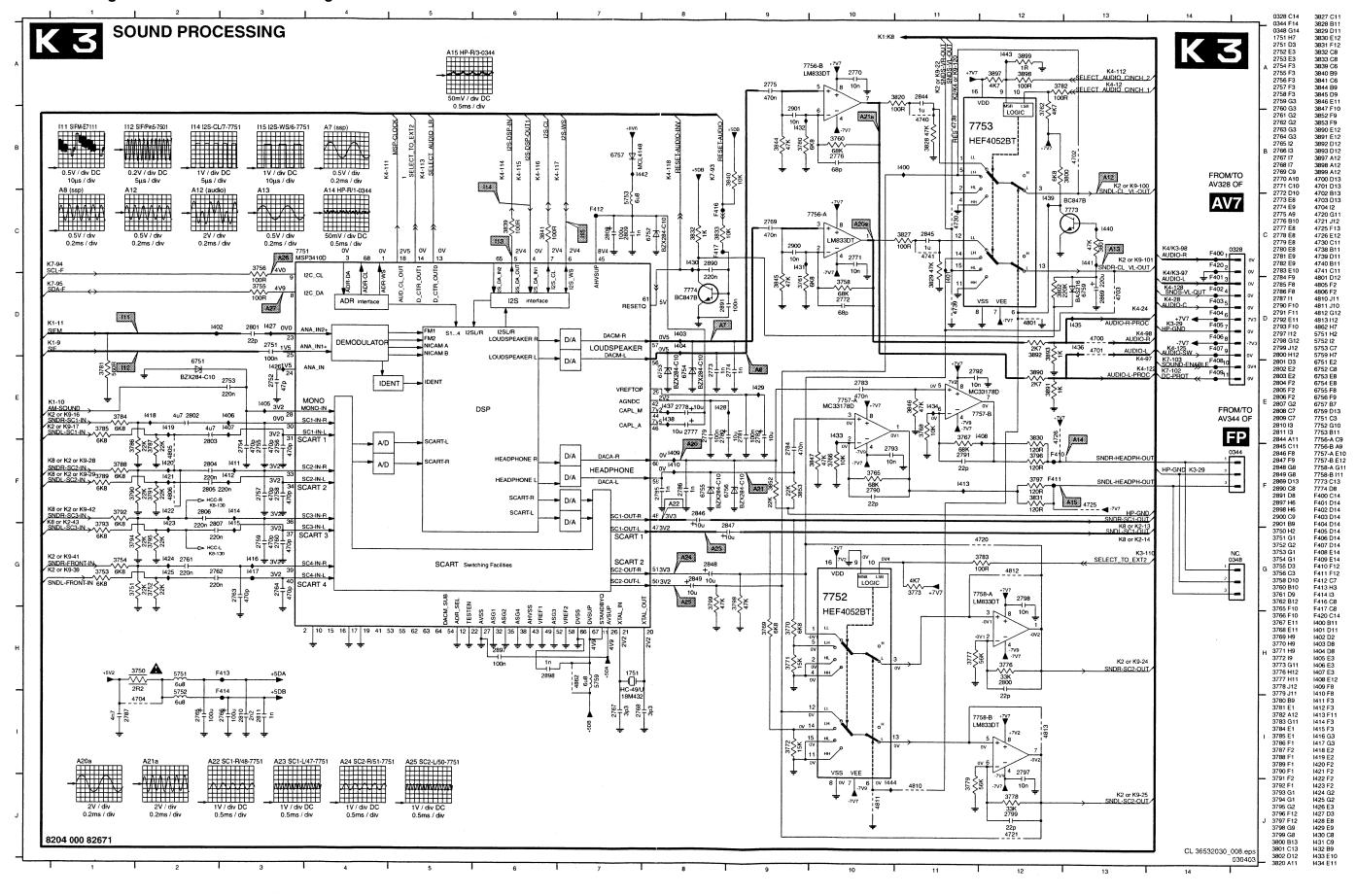
Small Signal Board: Tuner IF, Source Selection and Video Processing

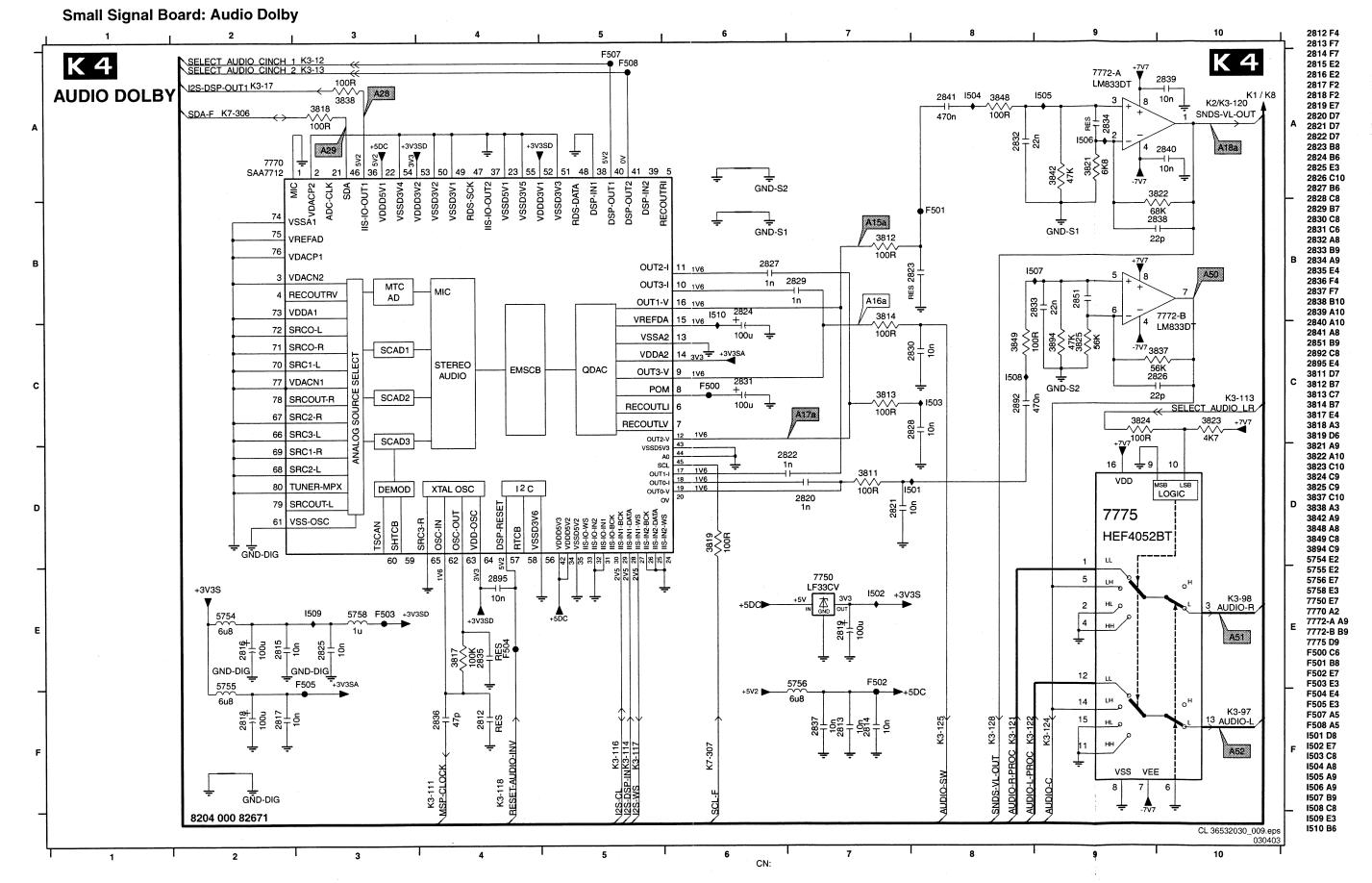
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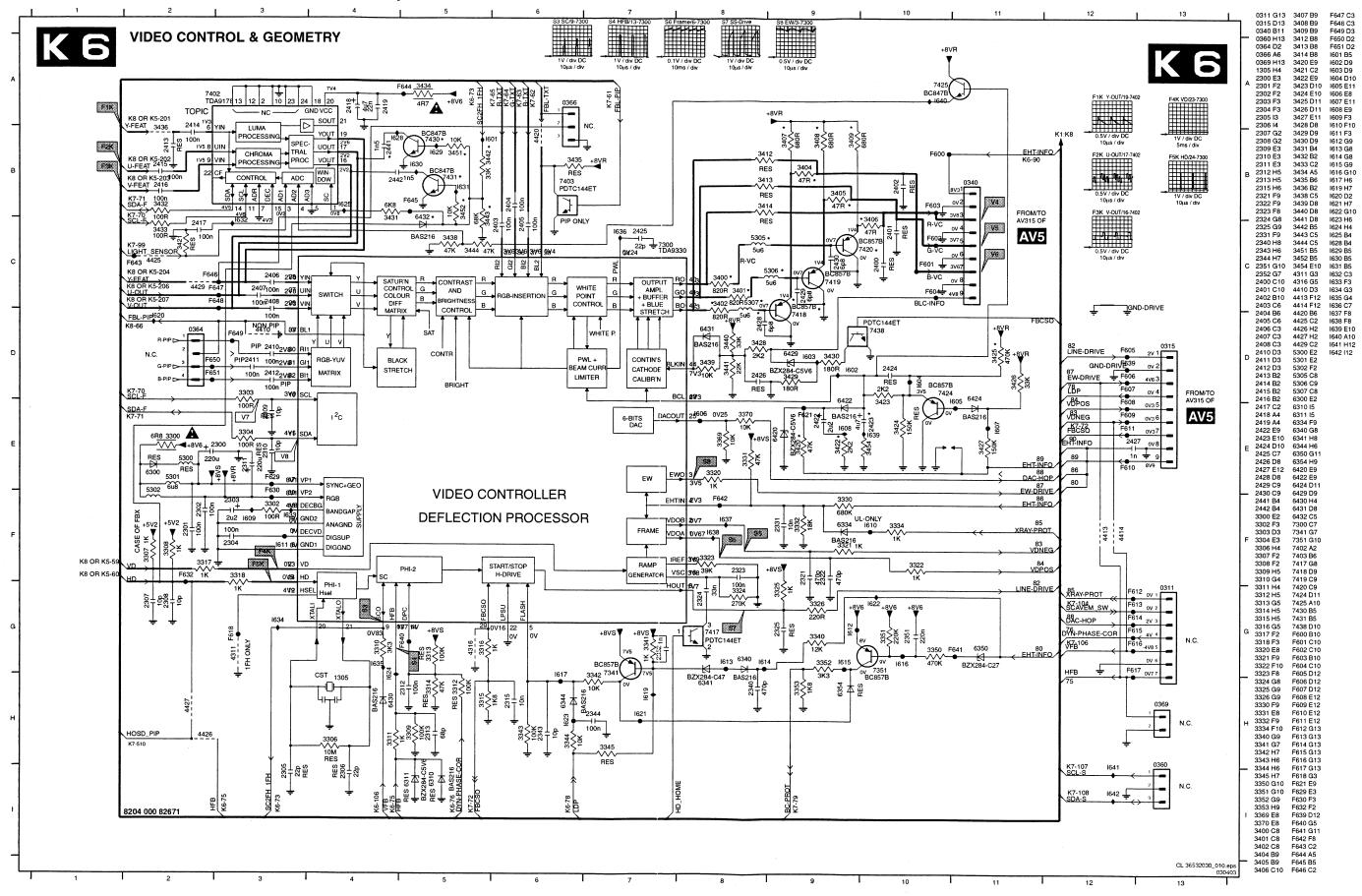


Small Signal Board: Sound Processing



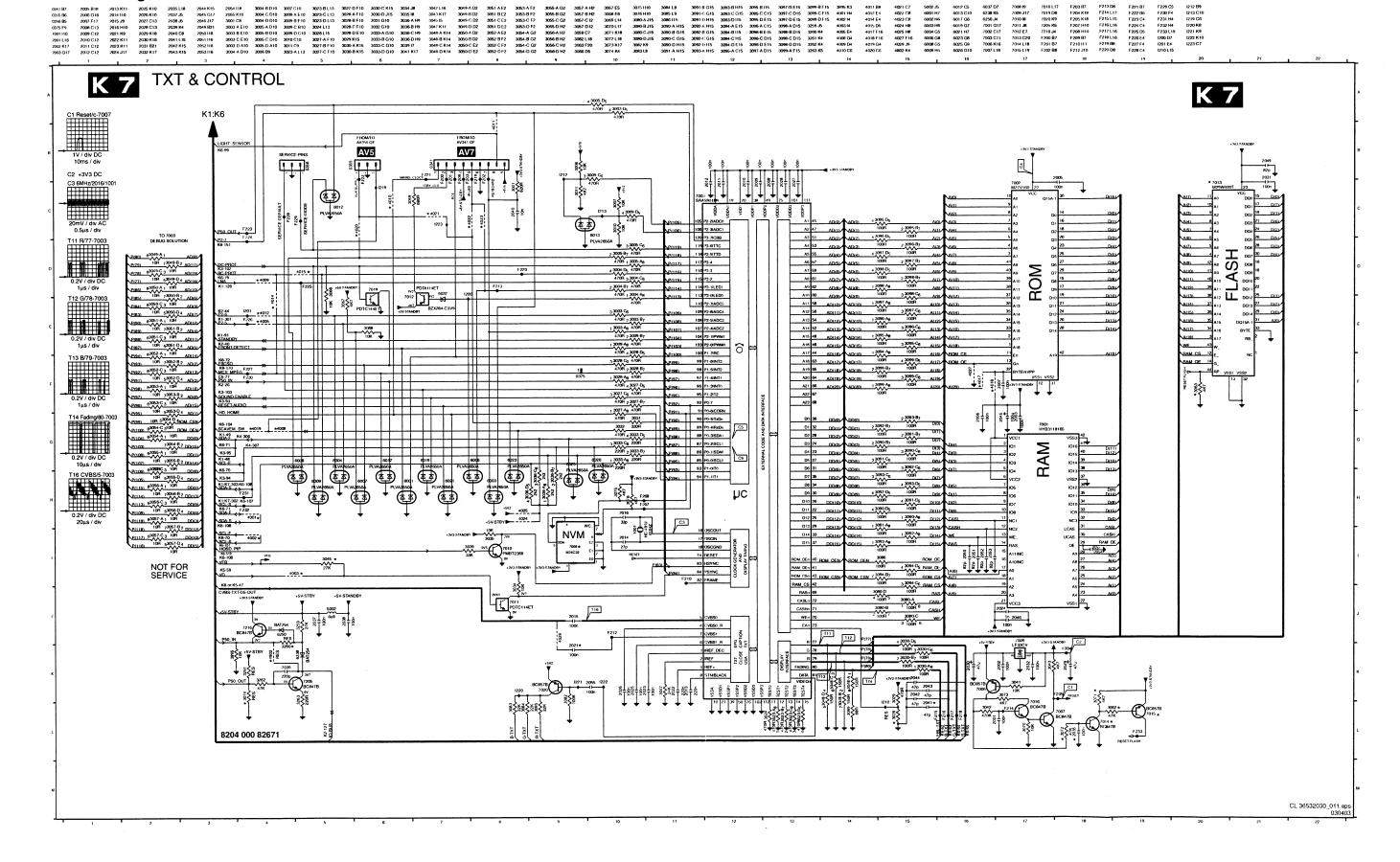


Small Signal Board: Video Control and Geometry

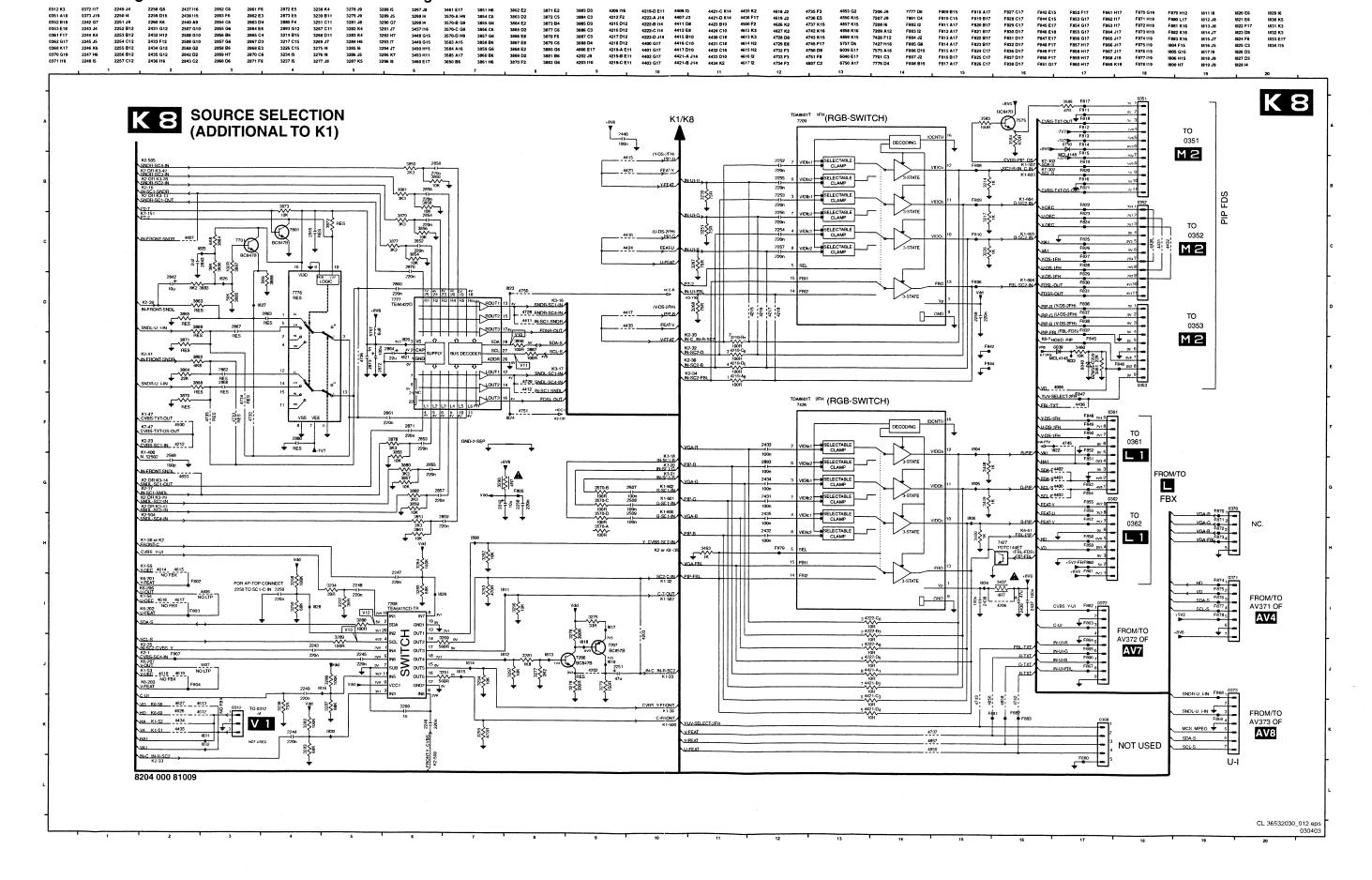


7.

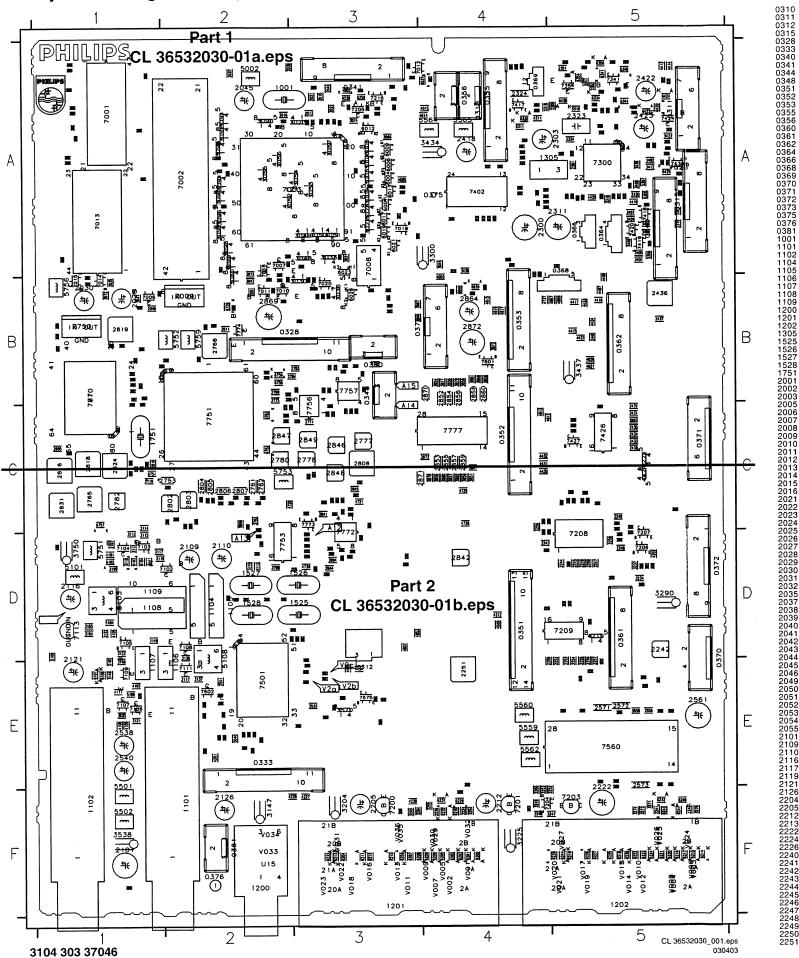
Small Signal Board: TXT and Control



Small Signal Board: Source Selection Add. to Diagram K1

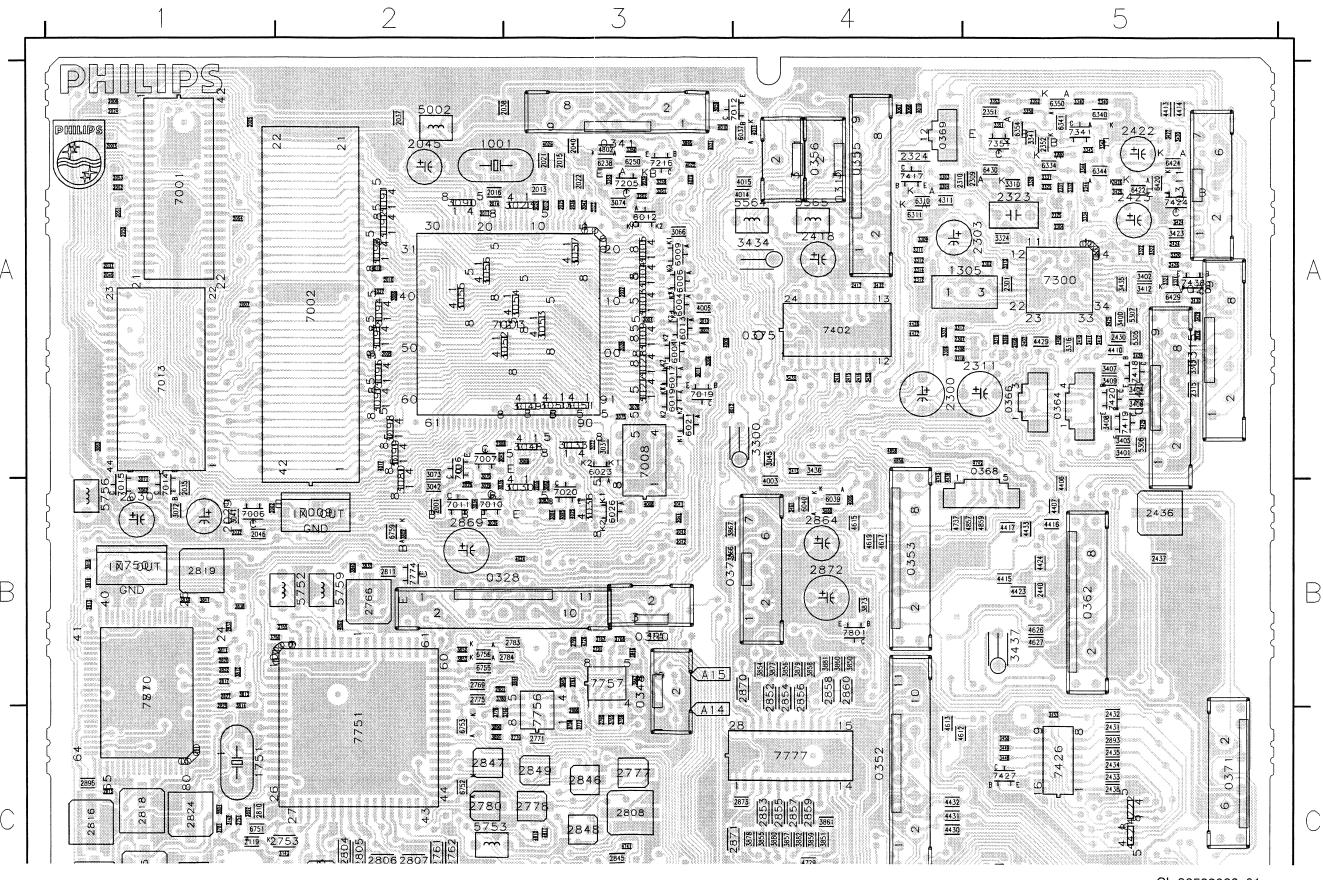


Layout Small Signal Board (Overview Top Side)

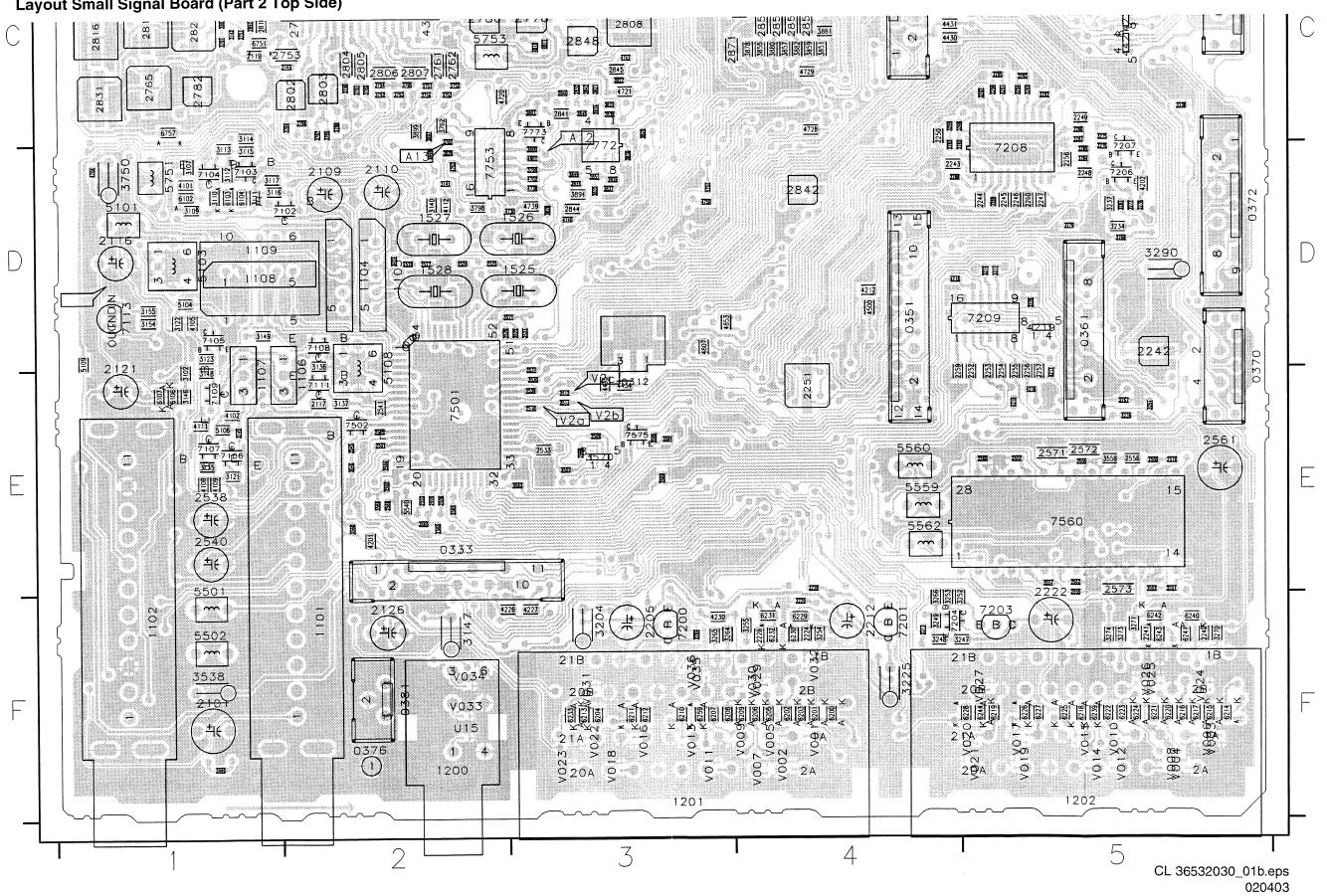


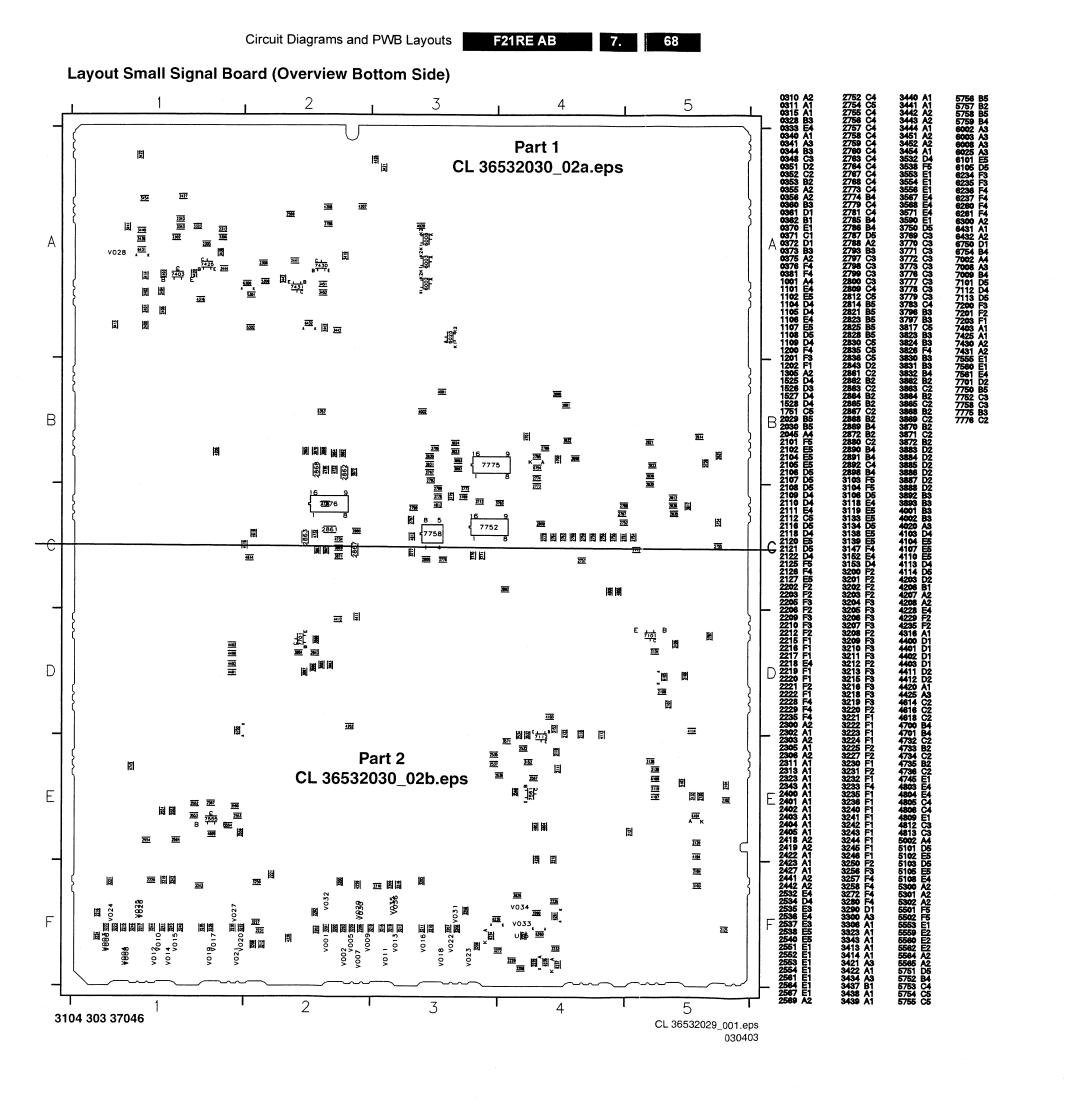
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77001 A1
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77015 B1
77015 B1
77016 B2
77109 B3
77102 D2
77109 D1
7104 D1
7105 D1
7106 E1
7107 E1
7107 D1
7108 D2
71109 D1
7108 D2
71109 C1
7109 C1
7109 C1
7109 C3
7109 C3
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Layout Small Signal Board (Part 1 Top Side)

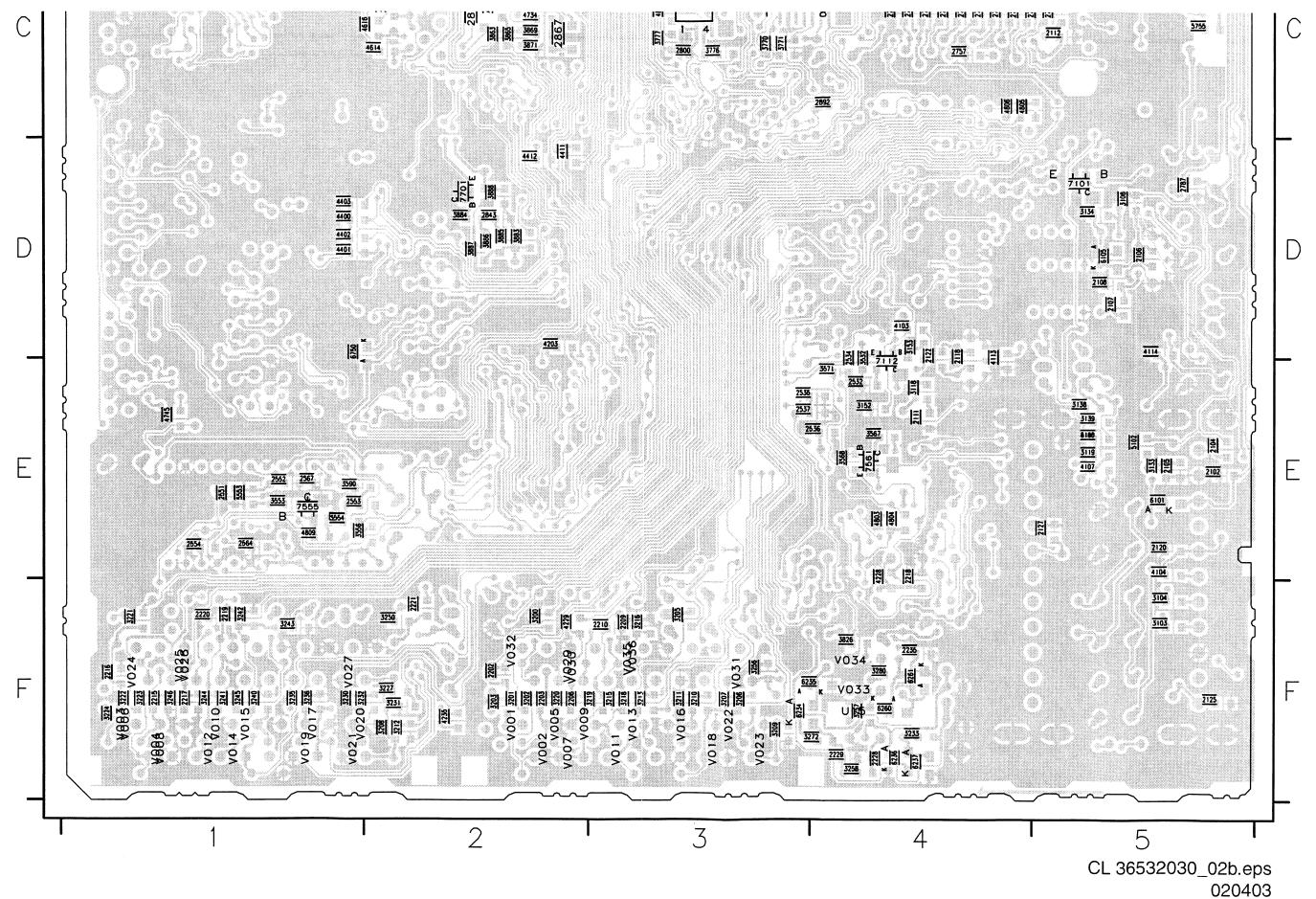


Layout Small Signal Board (Part 2 Top Side)





Layout Small Signal Board (Part 2 Bottom Side)



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1 V / div DC

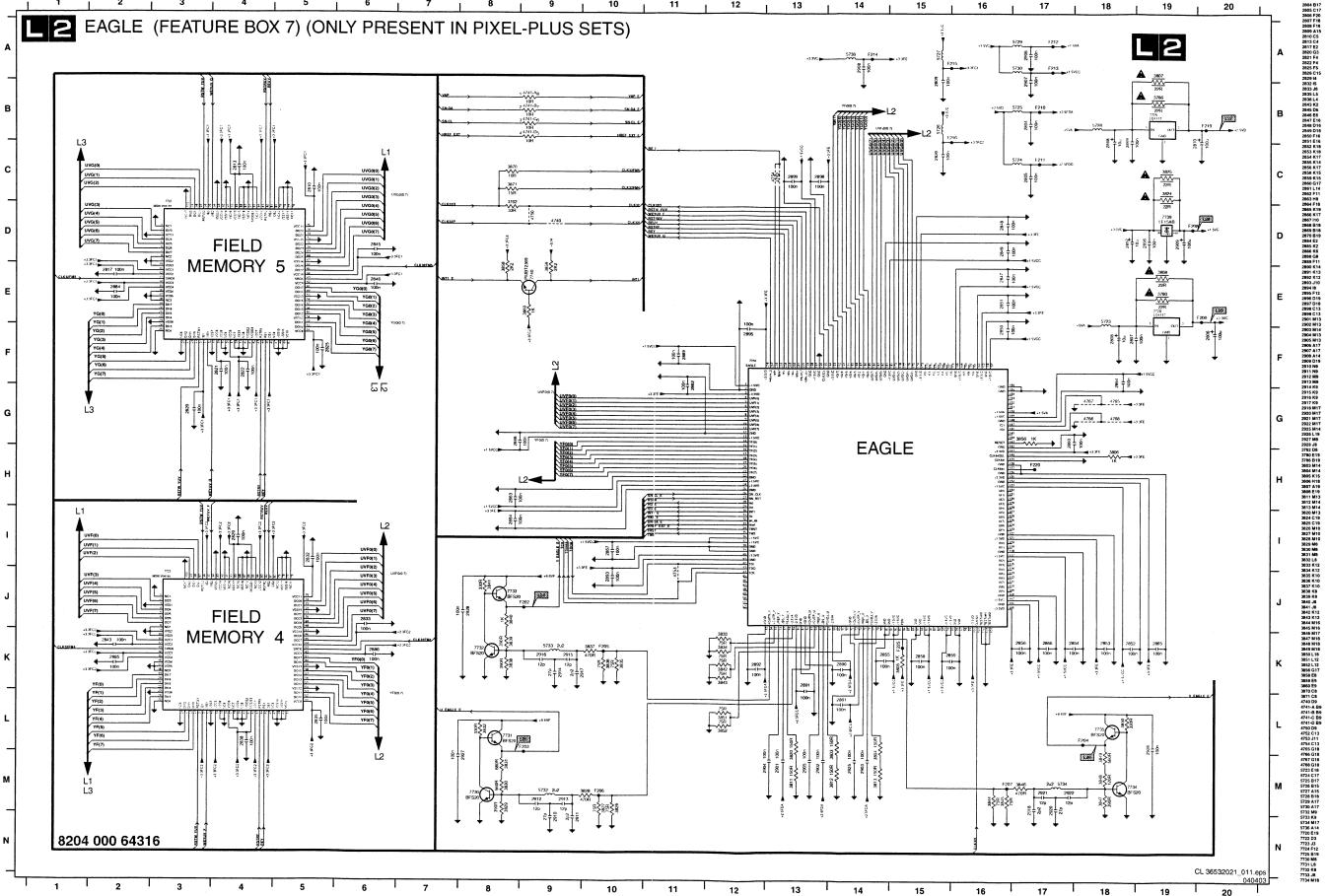
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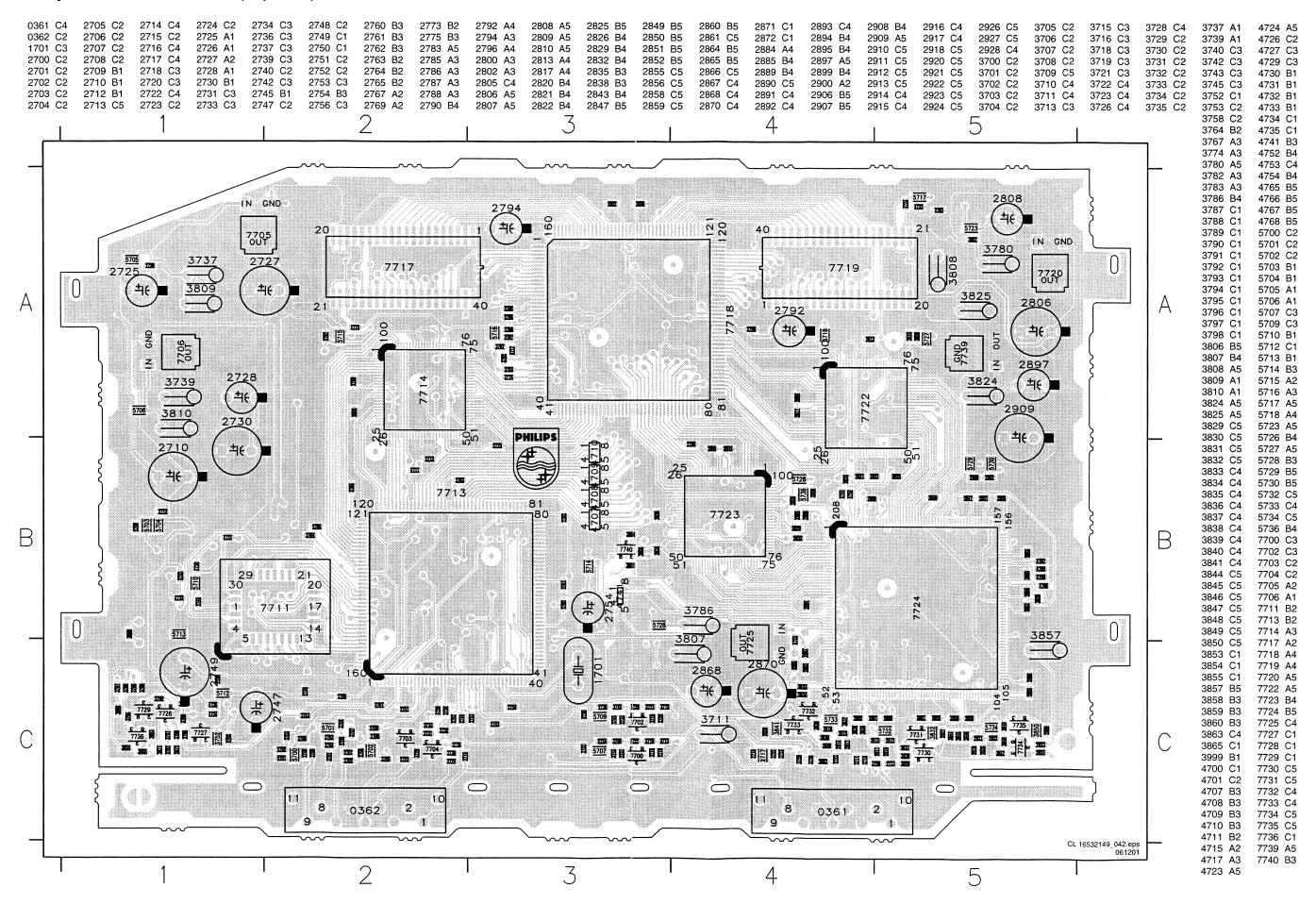
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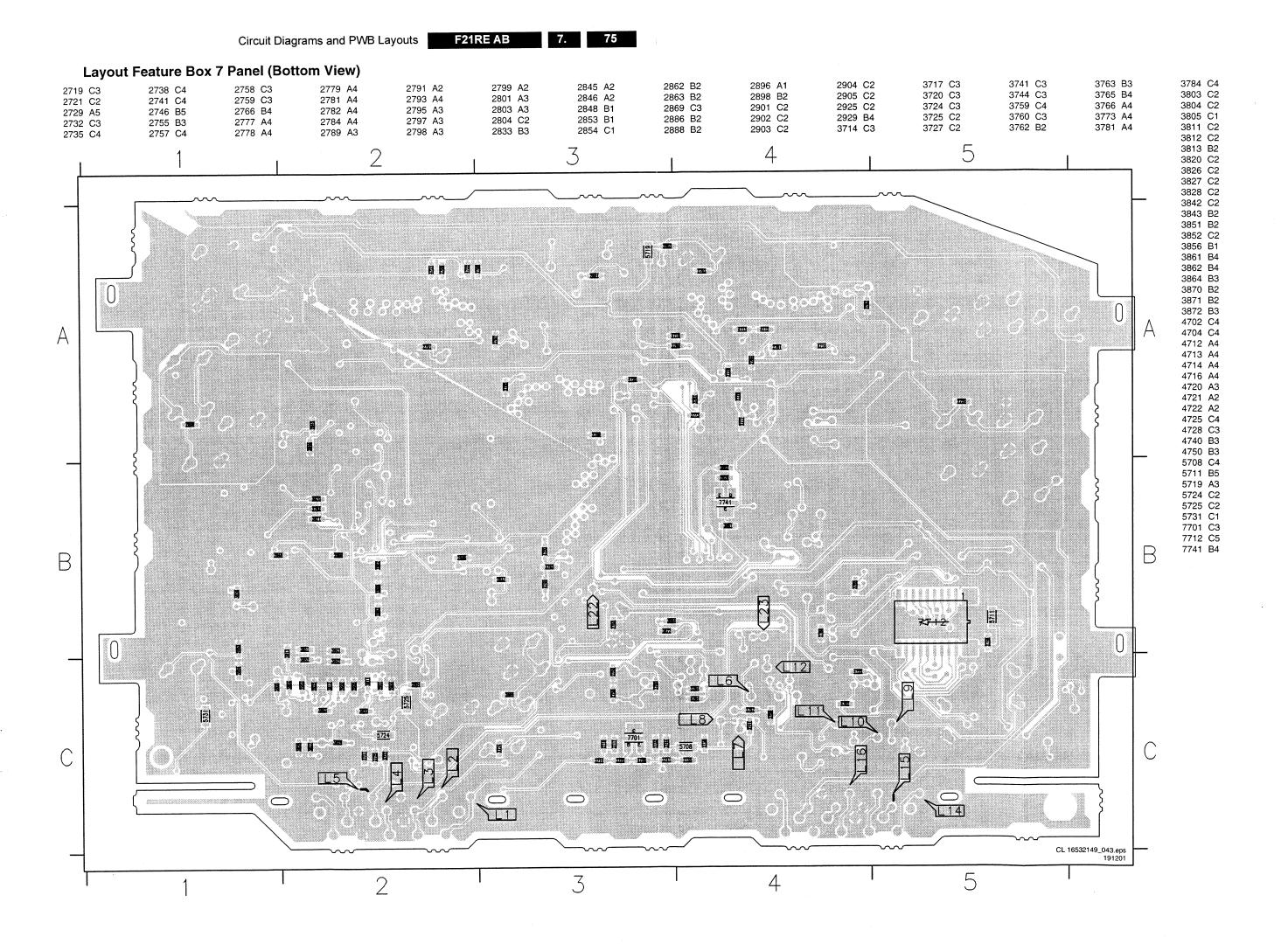
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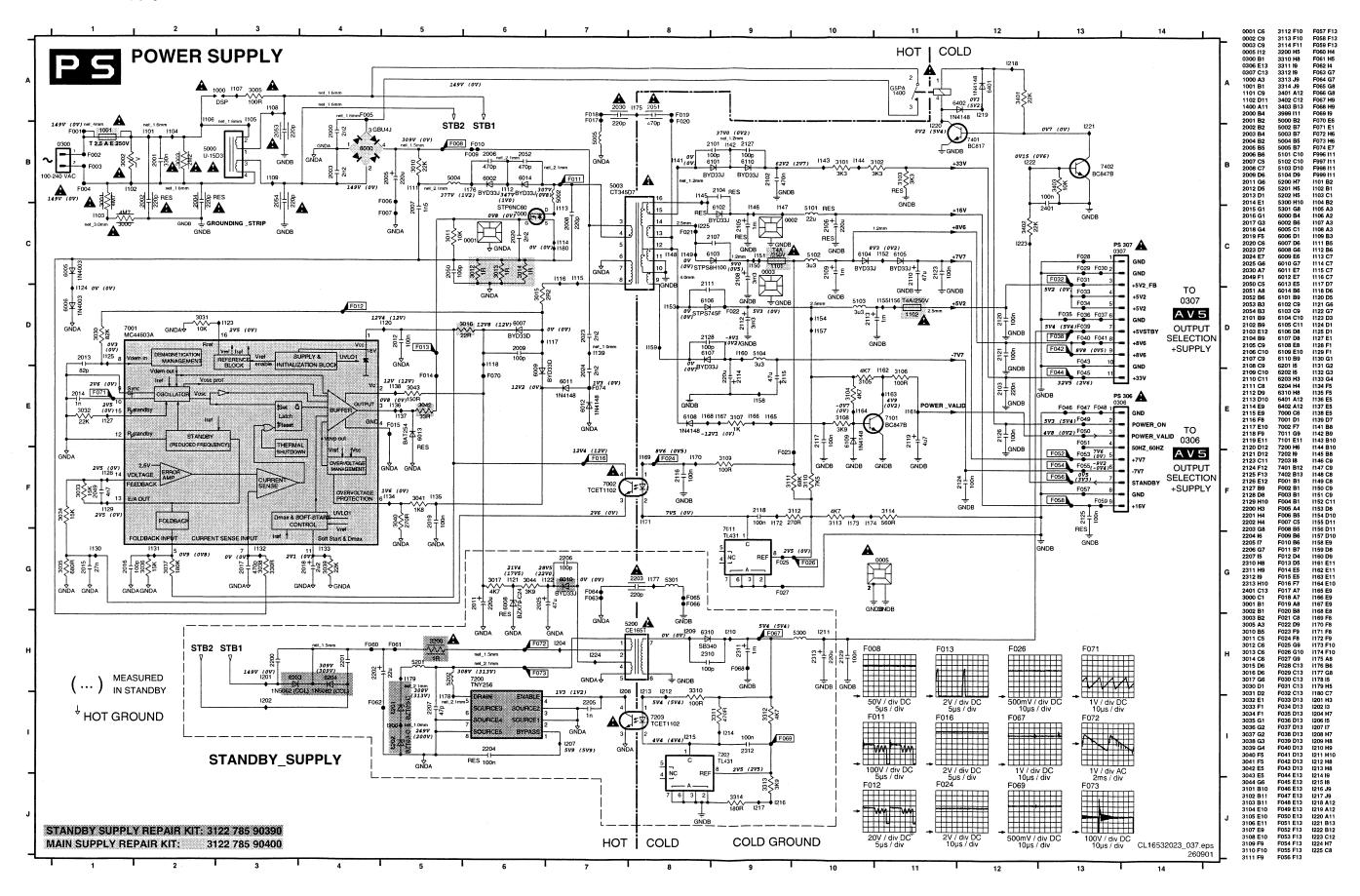


Layout Feature Box 7 Panel (Top View)

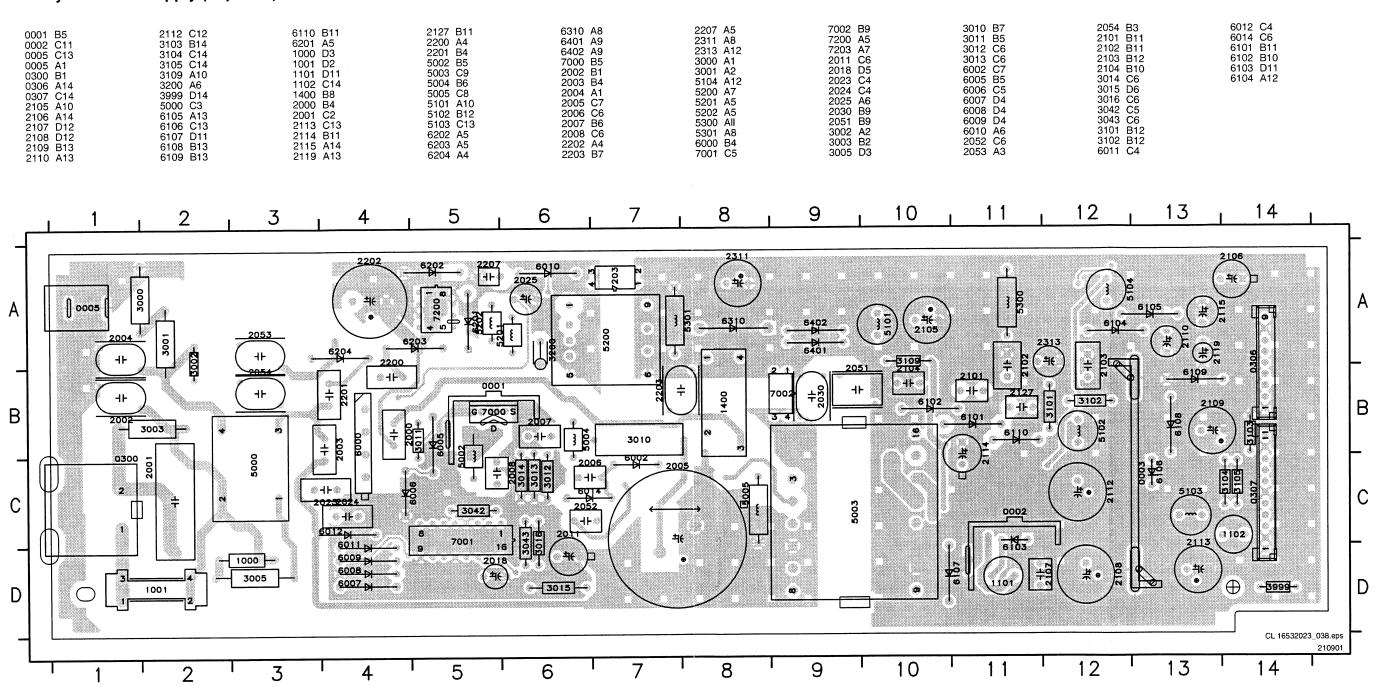




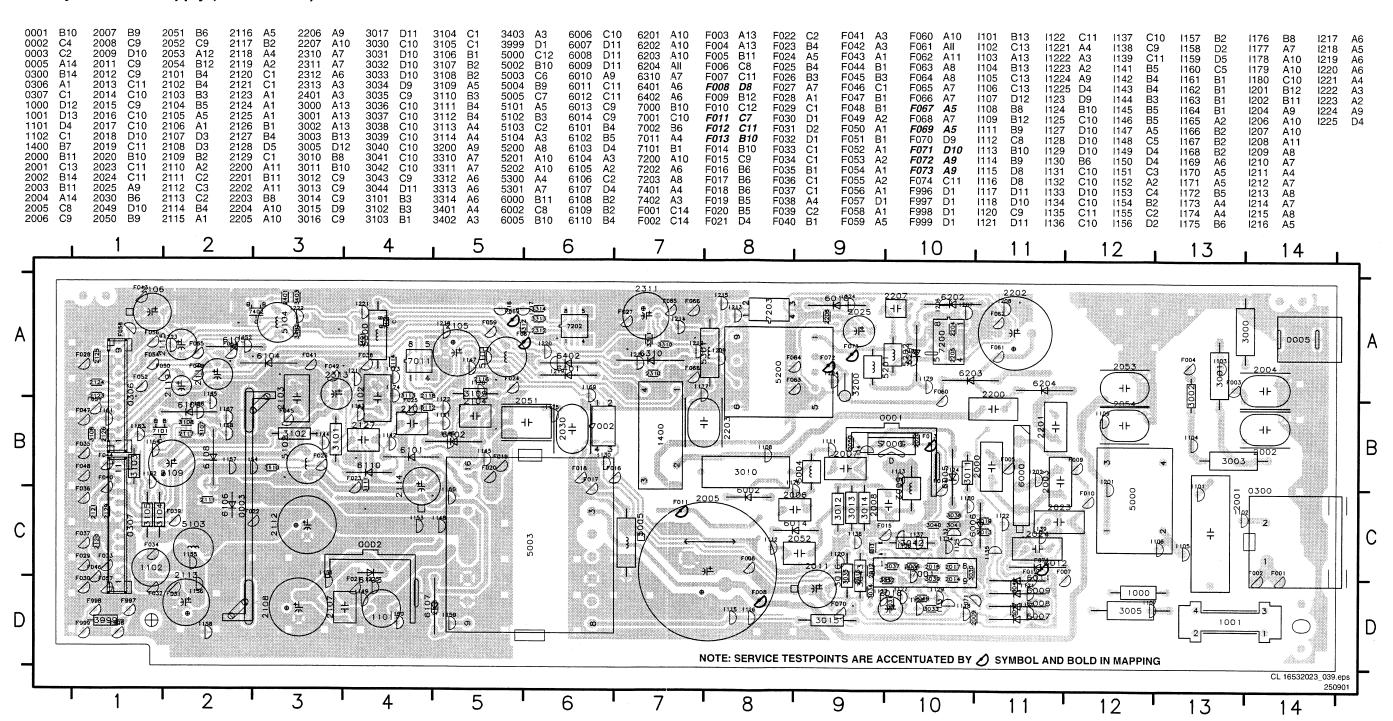
Power Supply



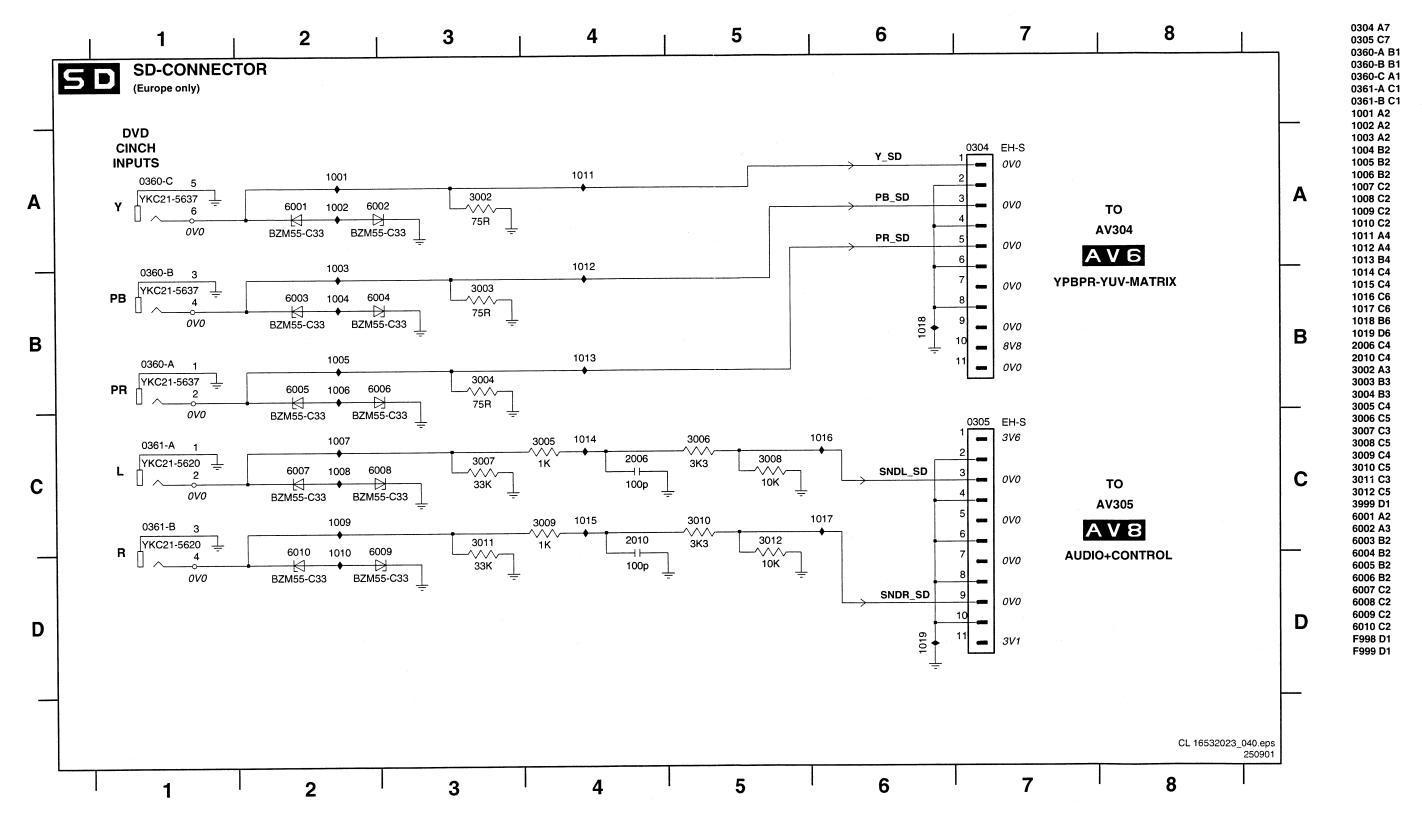
Layout Power Supply (Top Side)



Layout Power Supply (Bottom Side)



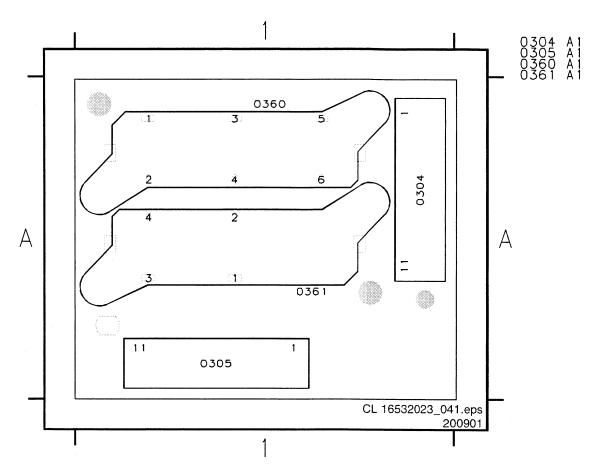




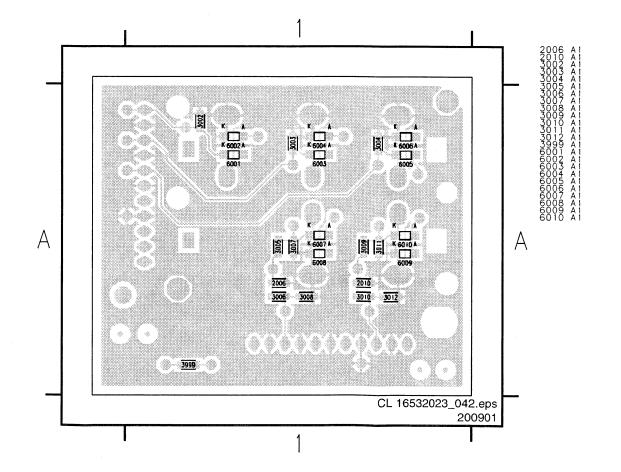
Circuit Diagrams and PWB Layouts

F21RE AB

Layout SD-Connector (Top Side)



Layout SD-Connector (Bottom Side)



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8. Electrical Alignments

Index of this chapter:

- 1. General Alignment Conditions
- 2. Hardware Alignments
- 3. Software Alignments
- 4. Option Settings

Notes:

- The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the CURSOR UP, DOWN, LEFT AND RIGHT keys of the remote control transmitter.
- Figures below can deviate slightly from the actual product, due to different set designs.

8.1 General Alignment Conditions

Perform all electrical alignments under the following conditions:

- Power supply voltage: 230 V_ac ± 10%, 50 Hz ± 5%.
- · Allow the set to warm up for approximately 20 minutes.
- Voltages and waveforms are measured in relation to tuner earth (with exception to the voltages on the primary side of the power supply).

Caution: never use heatsinks as ground.

• Test probe: Ri > 10 MOhm, Ci < 20 pF.

Before performing any alignments, set the receiver box to the following settings:

- · Dynamic contrast: OFF (via the PICTURE menu).
- Active control: OFF (via the remote control. The ACTIVE CONTROL key is the key between the smart keys, and toggles Active Control ON and OFF).
- Smart Picture mode: ECO.

8.2 Hardware Alignments

8.2.1 40.4 MHz Neighbour-channel Sound Trap Alignment

- Tune to a checker board test pattern (system PAL B/G with a carrier frequency of 475.25 MHz).
- Connect an oscilloscope to pin 19 (CVBS out) of the SCART1 connection and trigger line frequent.
- Align the coil L5103 (diagram K1) completely downwards (see figure "SSP topview").
- Align the coil upwards untill under- and overshoot arise at the black/white and white/black transitions in the video signal (see figure "Waveform sound trap alignment").
- Align the coil downwards again, untill above mentioned under- and overshoot just disappears.

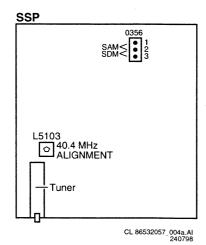


Figure 8-1 SSP top view

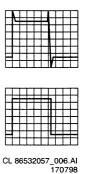


Figure 8-2 Waveform sound trap alignment

8.3 Software Alignments

Notes:

- · Alignments are stored automatically
- Dealer option settings are stored automatically
- Service option settings must be stored with the STORE OPTIONS item in the top level SAM menu. It is not necessary to turn the receiver box OFF and back ON in order to store the values in NVM.

Put the set in SAM mode (see chapter 5). Now you can select the following alignments:

- 1. GENERAL:
 - LUMA GAIN
 - IF AFC
 - IF LPRIME AFC
 - TUNER AGC
 - BLEND INTENSITY
 - FBX TEST PATTERN

2. DRIVE:

- TEST PATTERN
- RED
- GREEN
- BLUE
- RED BL OFFSET
- GREEN BL OFFSET
- 3. LUM. DEL:
 - LUM. DELAY PAL BG
 - LUM. DELAY PAL I
 - LUM. DELAY SECAM
 - LUM. DELAY BYPASS

8.3.1 GENERAL Alignments

LUMA GAIN

This item has a fixed value of "3" (for EU/AP).

IF AFC

Connect the RF output of a video pattern generator to the antenna input.

From the generator, supply a PAL B/G TV signal with a signal strength of at least 1 mV and a frequency of 475.25 MHz.

Alignment procedure:

- Go to the INSTALL menu.
- 2. Select MANUAL INSTALLATION.
- 3. Tune the TV-set to the system and frequency described above via SEARCH 475.00 OK.
- If the frequency shown in the FINE TUNE line (after the SEARCH is completed) is between 475.18 MHz and 475.31 MHz, you do not need to realign the IF AFC.

- 8.
- If the frequency lies outside this range, adjust the frequency in the FINE TUNE line to 475.25 MHz and STORE the program (this is very important because this will disable the AFC algorithm).
- Navigate to the SAM main menu and select ALIGNMENTS

 GENERAL IF AFC.
- During the IF AFC parameter adjustment, there is OSD feedback at the top of the screen.
- 8. This OSD feedback will contain one of four messages:

Table 8-1 AFC Alignment feedback

AFC-window	AFC-frequency versus reference
Out	High
In	High
In	*Low*
Out	Low

The first item (IN or OUT) informs you whether you are in or out of the AFC window. The second item (HIGH or LOW) informs you whether the AFC frequency is too high or too low.

- Adjust the IF AFC parameter until the first value is within the AFC window (= IN).
- Next, adjust the IF AFC parameter until the second value is LOW.
- 3. After adjustment, STORE the value.
- 4. Return to the INSTALL menu.
- Select MANUAL INSTALLATION SEARCH 475.00 OK and STORE. This will turn the AFC algorithm ON again.

Service tip: If you do not trust the frequency accuracy of your service generator, connect it to a "good" TV set and check it with the FINE TUNE line.

IF LPRIMEAFC

Same procedure as described above but with other signal source (SECAM L').

TUNER AGC

Connect the RF output of a video pattern generator to the antenna input.

From the generator, supply an PAL B/G TV signal with a signal strength of approximately 2 mV and a frequency of 475.25 MHz.

Measure the DC voltage on pin 1 of the Tuner (item 1102). You can adjust this voltage by adjusting the TUNER AGC item in the SAM menu. Alignment is correct when the DC voltage is just below $3.8\ V.$

BLEND INTENSITY

This adjustment aligns the level of transparency of the menu display that is blended into the main display. Use this alignment when the main microprocessor or the HOP IC is replaced.

- Set the BRIGHTNESS, CONTRAST, and COLOR values (in the PICTURE menu) at the midpoint.
- Using a video pattern generator, apply a signal with a 100% white video pattern to the set.
- Connect an oscilloscope to the "Red" output of the Receiver box (pin 1 of the MONITOR OUT sub-D connector) and measure the Red output level.
- Align the BLEND INTENSITY parameter so that the blended signal is 65 % of the black/white amplitude. This ratio will be about 0.45 V (blended signal) to 0.7 V (full white signal).

FBX TEST PATTERN

When this pattern is switched on, the set will display a picture that slowly changes from black to white, and vice versa. Use this pattern to check the functionality of the circuitry behind the FBX and the FBX function itself.

You can also use this pattern as a picture generator for the Flat TV plasma monitor (for example, for checking cell defects, interpretation of the ADC/DAC converters, etc).

Important: Be sure to set this pattern to OFF again when it is no longer needed, since it will not be automatically disabled when SAM is exited.

8.3.2 DRIVE Alignments

TEST PATTERN

The TEST PATTERN is not really needed for the alignment of the Receiver box. It can be used in the TV configuration as a test pattern to align the white colour temperatures of the monitor. However, the monitor itself (as a stand alone unit) can also be aligned in other ways (described in the Service Manual of the TV monitor).

RGB Output Amplitude Adjustment

- Load the RGB output (sub-D connector AV303) of the Receiver box with a TV monitor (or match RGB output lines with 75 ohm resistors, if no monitor is available), and measure the outputs with an oscilloscope.
- Apply an artificial white CVBS signal (1 V_pp white-to-topsync, with a 0.3 V sync amplitude) to the external 2 input.
- 3. Set LUMA GAIN to a value of "3" (via the SAM menu ALIGNMENTS GENERAL).
- Set RED, GREEN, and BLUE to "24" (via the SAM menu ALIGNMENTS - DRIVE).
- 5. Set RED BL OFFSET and GREEN BL OFFSET to "7".
- Adjust the gain (with the RED, GREEN, and BLUE slider bars) until the oscilloscope-measured values for R, G, and B are 700 mV ± 10 mV with respect to the front porch of the signal.

8.3.3 LUM. DELAY Alignments

With this alignment, you place the luminance information directly on the chrominance information (brightness is pushed onto the colour). Input a colour bar or grey scale pattern as a test signal.

LUM. DELAY PAL BG

Set value to "12". If the luminance signal referred to the chrominance signal still has a time delay, adjust the value to solve this.

LUM. DELAY PAL I

Set value to "12". If the luminance signal referred to the chrominance signal still has a time delay, adjust the value to solve this.

LUM. DELAY SECAM

Set value to "11". If the luminance signal referred to the chrominance signal still has a time delay, adjust the value to solve this.

LUM. DELAY BYPASS

Set value to "10". If the luminance signal referred to the chrominance signal still has a time delay, adjust the value to solve this.

8.4 **Option settings**

8.4.1 Introduction

The microprocessor communicates with a large number of (I2C) ICs in the set. To ensure good communication and make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence or absence of specific ICs or functions is made known by means of the option codes.

All options codes can be manipulated using both the Option Numbers and/or the Option menu.

All hardware related options are incorporated under the heading SERVICE OPTIONS in the SAM main menu. All software related options are incorporated under the heading DEALER OPTIONS in the SAM main menu.

After you have changed the option(s), save them via the STORE OPTIONS command. The new option setting is only active after the TV is switched OFF and ON again via the mains switch (the EAROM is then read again).

8.4.2 Dealer Options

Select this sub-menu to set the initialisation codes (= options) of the set via text menu's.

Menu name	Subjects	Options	Physically in set
Personal	Picture Mute	Yes	Video mute active when there is no signal detected
Options		No	Noise when there is no signal detected
	Virgin Mode	Yes	TV starts up with language selection menu
	_	No	TV does not start up with language selection menu
	Auto Store	None	Auto Store mode disabled (not in installation menu)
	Mode (for EU)	PDC-VPS	Auto Store mode via ATS (Automatic Tuning System) enabled
		TXT page	Auto Store mode via ACI (Automatic Channel Installation) enabled
		PDC-VPS-TXT	Auto Store mode via ATS or ACI enabled
	Txt Preference	FLOF	Preference to FLOF (Full Level One Features) teletext
	(for EU)	TOP	Preference to TOP (Table Of Pages) teletext

Electrical Alignments

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Figure 8-3 Dealer options overview

8.4.3 Service Options

Select this sub-menu to set the initialisation codes (= options) of the set via text menu's.

Menu-item	Subjects	Options	Description
Chassis region	Region (for EU)	Europe	Setting for Europe
		AP	Setting for AP PAL-multi
Dual Screen	PIP/Dual Screen	Yes	Feature present
		No	Feature not present
	TXT/EPG Dual	Yes	Feature present
	Screen (for EU)	No	Feature not present
Teletext	Flash RAM (for EU)	Yes	Flash RAM present
	` ′	No	Flash RAM not present
	NexTView (for EU)	2	EPG level 2 setting
	1 '	2C3	EPG level 3 setting
Monitor type	Monitor	F19	Receiver-box can operate with 42î F19D-monitor, when jumper settings or AVI-panel are configured in 1.9-mode
		FM23	Receiver-box can operate with 321 FM23-monitor, when jumper settings on AVI-panel are configured in 2.3-mode
		FM24 (SL)	Receiver-box can operate with 42î FM24-monitor, when jumper settings on AVI-panel are configured in 2.3-mode (SL= Speaker Less)
		FM25-SL	Receiver-box can operate with 50î FM25-monitor, when jumper settings on AVI-panel are configured in 2.3-mode (SL= Speaker Less)
		FM26 (SL)	Receiver-box can operate with 42î FM26-monitor, when jumper settings on AVI-panel are configured in 2.3-mode (SL= Speaker Less)
Video repro	Featurebox type	Eagle	Eagle present (Pixel Plus)
		Falconic	Eagle not present (no Pixel Plus)
	Light sensor	Yes	Feature present
		No	Feature not present (for FTV1.9 and FM25-SL monitors only)
	2D Combfilter	Yes	Feature present
		No	Feature not present
	3D Combfilter	Yes	Feature present (for US only)
		No	Feature not present
	Picture	Yes	LTP (TOPIC) present
	improvement	No	LTP (TOPIC) not present
	Auto scavem	Yes	Feature present
		No	Feature not present
	Pixel Plus	Yes	Feature (Eagle) present
		No	Feature (Eagle) not present
	Signalling bits	Yes	For 16:9 sets
		No	For 4:3 sets
Miscellaneous	Home Cinema	Yes	Set with Home Cinema link
	(for EU)	No	Set without Home Cinema link
	Integrated Cinema	Yes	Feature present
	(for EU)	No	Feature not present
	Stand Alone	Yes	Option needed for Service to be able to service the receiver-box with a normal PC monitor
		No	Default setting. In this setting, the receiver-box will go to Standby when connected to PC monitor
Opt. No.	Group 1		e.g. 04492 08449 49555 04112 (see sticker on bottom receiver-box)
	Group 2		e.g. 04151 00000 00000 00257 (see sticker on bottom receiver-box)
Note: Above ave		ne for all region	is (EU/AP/US). The correct settings differs per region (see Option Numbers).

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Figure 8-4 Service options overview

Option Numbers

Select this sub-menu to set all options at once (expressed in two long numbers).

An option number (or 'option byte') represents a number of different options. When you change these numbers directly, you can set all options very fast. All options are controlled via eight option numbers.

Example: The sticker on the bottom cover of an E-box gives the following option numbers:

04556 00257 49411 04112 04119 00001 00000 00271

The first line (group 1) indicates options 1 to 4, the second line (group 2) options 5 to 8 (see tables below).

Every 5-digit number represents 16 bits (so maximum number can be 65536 if all options are set).

When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number.

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*) Note: Bits that are not used have a fixed value of "0", and are mentioned as "n.a. *" in above overview.

ОВ	Bit	Option name	Settings (in decimal values) f	or F21RE_AB chassis	Option Number
	0	Auto TV mode	0= Off	1= On	
	1	Auto Store Mode	0= None	2= PDC/VPS	
	2			4= TXT Page	
				6= PDC/VPS/TXT Page	
	3	n.a. *	0		
	4	Picture Mute	0= Off	16= On	
	5	Demo mode	0= Off	32= On	
5	6	Virgin mode	0= Off	64= On	Sum OB5
	7	n.a. *	0		(decimal)
	8	n.a. *	0		(dccimal)
	9	n.a. *	0	!	
	10	n.a. *	0		
	11	n.a. *	0		
	12	TXT Preference	0= TOP	4096= FLOF	
	13	n.a. *	0		
	14	n.a. *	0		
	15	n.a. *	0		
	0	P50 DVD menu-line	0= Off	1= On	
	1	Asia	0= Off	2= On	
	2	n.a. *	0	!	
	3	n.a. *	0	1	
	4	n.a. *	0	en de la companya del la companya de	
	5	n.a. *	0	1	
	6	n.a. *	0	<u> </u>	
	7	n.a. *	0	1	Sum OB6
6	8	n.a. *	0	· · · · · · · · · · · · · · · · · · ·	(decimal)
	9	n.a. *	0		— (acca.)
	10	n.a. *	0		
	11	n.a. *	10		
	12	n.a. *	0		
	13	n.a. *	10		
			10	<u> </u>	
	14	n.a. *	0		
	15	n.a. *			
	0	n.a. *	0		
	1	n.a. *	0	-	
	2	n.a. *	0		
	3	n.a. *	0		<u>i</u>
	4	n.a. *	0	į	
	5	n.a. *	0		
	6	n.a. *	0		
7	7	n.a. *	0	!	Sum OB7
•	8	n.a. *	0	,	(decimal)
	9	n.a. *	0		
	10	n.a. *	0		
	11	n.a. *	0		
	12	n.a. *	0		
	13	n.a. *	0	1	
	14	n.a. *	0		
	15	n.a. *	0		
	0	Cabinet	0= (not appl. for FTV)	1 - 14= (not appl. for FTV)	
	1			15= Other (fixed)	
	2]			
	3	1			
	4	SLDP	0= Off (fixed)	16= On (not appl. for FTV)	
	5	n.a. *	0		
	6	AVL	0= Off (fixed)	64= On	
	7	n.a. *	0		_
8	8	FTV Monitor	0= FTV1.9	256- EM22 (-1-4	Sum OB8
_	9	(auto detect)]	256= FM23 (default)	(decimal)
		1 `		512= FM24	
	10	4		768= FM24-SL	
	11]		† 1024= FM25-SL † 1280= FM26	
	12	1		1280= FM26 1536= FM26-SL	
	13	1		1792= FM27	
		1		2048= FM27-SL	
1	14	4		65280= Other	
	15				

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Figure 8-6 Option bytes Group 2

9.

9. Circuit Descriptions, List of Abbreviations, and IC Data Sheets

Index of this chapter:

- 1. Introduction
- 2. Power Supply Unit (PSU)
- 3. Audio Video Interface panel (AVI)
- 4. Small Signal Panel (SSP)
- Front panel (FP)
- 6. Auto TV
- 7. Abbreviations
- 8. IC Data sheets

Note:

- Figures can deviate slightly from the actual product, due to different set designs.
- For a good understanding of the following circuit descriptions, please use the diagrams in chapter 6 and 7.
 Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

This Receiver box (or E-box) is developed for the global market. The service chassis name is F21Rx (x stands for the region; e.g. E=Europe, U= USA). It is an economic version of the F22Rx chassis, with the following features:

- Feature Box 7 for better EMC behaviour and improved "Natural Motion", however without "Eagle" (Pixel Plus).
- Without "Double Window" panel.
- · Improved Tuner/Splitter (less noise).
- · Without "Down Scaler" panel.

It can drive both FTV1.9 and FM2x plasma screens.

9.2 Power Supply Unit (PSU, diagram PS)

9.2.1 PSU: Introduction

A 35W Power Supply is used in the Receiver box. It supports a range of input voltages (= global), and can be used for almost every E-box version. It delivers the voltages for the SSP, the DW, the FBX (+5VSTB, 5V2, 8V6, 7V7, -7V7 and 33V), and for the specific PWBs. The output of the power supply is connected to the AVI panel. This panel powers all the other PWBs.

The Mains voltage is applied to the input filter that feeds it to the standby supply. This supply is always operational and delivers the +5VSTBY voltage.

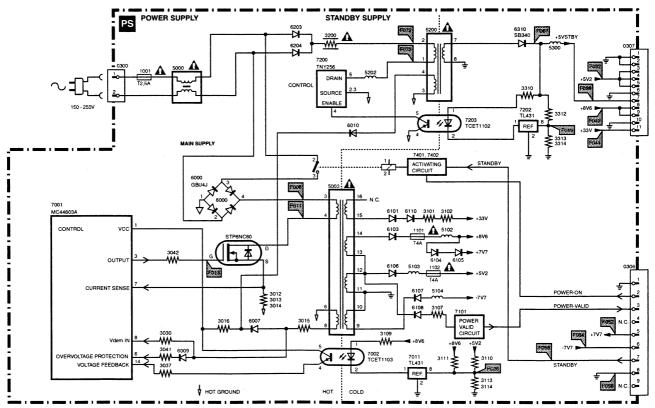
The task of the main supply is to deliver the supply voltages for the several electrical circuits in the Receiver box. It is switched via a single-pole relay, which is powered from the +5VSTBY voltage and controlled via the POWER_ON and STANDBY signals.

The reason to choose for a separate standby supply, instead of a single flyback supply (which can be driven in standby mode like a MC44604), is the requirement to have very low standby power consumption.

The "POWER ON/STBY" knob is located on the Front I/O panel and activates the relay supply (POWER_ON). The microprocessor is then able to switch the set from "standby" to "on" (STANDBY).

The green "POWER ON" LED is active, when the 8.6 V is present (HW controlled).

The red "STANDBY" LED is active in standby. The OTC controls this via ON_OFF_LED.



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Figure 9-1 Block Diagram Power Supply

The Power Supply module consists of three parts:

- 1. Mains voltage inlet and filter.
- 2. Standby supply.
- 3. Main supply.

The total power balance of the supply can be read from the following table:

Table 9-1 Total power balance

Supply	Value (V)	Tolerance (%)	Typ. Current (A)	P_max (W)
5V2	5.2	3	2.0	13
8V6	8.6	7	1.25	13.8
+7.7V_audio	8.6	7	0.1	1.2
-7.7V_audio	-5.2	7	0.1	1.2
33V_tuner	33		4 mA max.	0.1
5VSTB	5.32	5	0.3	2.7

9.2.2 PSU: Start-up Sequence

For a description of the "start-up sequence", we make a differentiation between the FTV1.9 and the FM2x monitors.

Start-up sequence for an E-box + FTV1.9 Monitor
There are five different "power states" in the E-box:

- Low Power Standby (P < 0.9 W). The Main supply is not working. Only the OTC and I/O Expanders (on the AVIpanel) are powered from the 5VSTB. The OTC works in one of the low power states (no program execution, but the UART, timer, RC pre-processor, and SW ADC are working).
- Standby (P < 3 W). The Main supply is not working. Only the OTC and I/O Expanders (on the AVI-panel) are powered from the 5VSTB. The OTC works in high power state (= normal).
- Semi Standby (Europe only). The Main supply is working.
 All PWBs are powered. The video in the HOP and the audio
 on the AVI board are muted. The sync is not send to the
 monitor. This state is used for EPG and P50 operations.
- On (P < 35 W). The Main supply is working. All PWBs are powered.
- Off. The OTC and I/O Expanders are not powered anymore. All the voltages are "off".

The E-box will always start-up in the "Standby" state until the CONFIG_IDENT is detected (means monitor attached). During initialisation, the E-box must check the "TV_standby" bit in the NVM, to decide into which state the E-box and monitor have to be put. This will set the STANDBY pin on the OTC accordingly. The initialisation starts when the E-box is switched "on" and the AC-power is connected. As a result, the 5VSTB supply is activated, and the OTC is activated. Now, the OTC checks the presence of the CONFIG_IDENT signal:

- If this check is successful (this means two following "hand shake" sequences are detected), then the state of the Ebox depends on the "TV_standby" bit in the NVM. This bit contains the history data about how previously the TV configuration entered the "standby" state (e.g. when this was done by the user (bit= 1), the set will stay in "standby").
- If this check is not successful, the E-box will go to "Low Power Standby".

Note: For service, the E-box can work in "Stand-alone" power mode. This is detected via the "Stand alone" bit in the NVM. This bit can be set in the Dealer/Service menu.

If the E-box is switched from "Standby" to "On", the STANDBY pin of the OTC is pulled "low", the relay switch is closed, and the main supply is started up. When the 5V2 and 8V6 voltages reach their nominal values, the 5V2_PROT and 8V6_PROT are activated. Now:

- The MSP shall be reset first, as this IC can disturb the I2C traffic, when not reset properly.
- Secondly, as the POPOV IC of the DW (F2R22 only) can pull the slow SDA line "low" when the HA signal from the main HIP is not available, all traffic on the slow I2C bus needs to be delayed until the HIP is properly initialised and settled. This means a wait state of 100 ms, after the crystal configuration of the HIP has correctly been read out.
- 3. Next, all other ICs are initialised. Now, the E-box is working, but the monitor is still not displaying a picture.
- The HOP switches on the PHI1 loop, the software sets all the necessary video and audio parameters, and enables them.

Start-up sequence for an E-box + FM2x Monitor

There are five different "power states" in the E-box:

- Low Power Standby (P < 0.9 W). The Main supply is not working. Only the OTC, I/O Expanders (on the AVI-panel) and remote circuits are powered from the 5VSTB. The OTC works in one of the low power states (no program execution, but the UART, timer, RC pre-processor, and SW ADC are working).
- Peripheral Standby (P < 3 W). This is an intermediate state. This mode is only used temporarily, if the OTC goes from low power standby to normal operation and vice versa.
- Semi Standby (Europe only). The Main supply is working.
 All PWBs are powered. The video in the HOP and the audio on the AVI board are muted. The sync is not send to the monitor. This state is used for EPG and P50 operations.
- On (P < 35 W). The Main supply is working. All PWBs are powered.
- Off. The OTC and I/O Expanders are not powered anymore. All the voltages are "off".

The E-box will always start-up in the "Standby" state until the AYT (Are You There) is detected. This means that an FM2x monitor is attached (this is different from the FTV1.9 monitor, where a separate CONFIG_IDENT line is used). During initialisation, the E-box must check the "Stand_alone" bit in the NVM. If this bit and the "TV_standby" bit both are not set, the AYT protocol is started, and will wake up the monitor. This will set the STANDBY pin on the OTC accordingly. The initialisation starts when the E-box is switched "on" and the AC-power is connected. As a result, the 5VSTB supply is activated, and the OTC is activated. Now, the OTC checks the

- presence of the "Standby" bit:

 If the "Standby" bit and the "Stand_alone" (or "Service/Factory") bit are not set, the AYT protocol is enabled, which will wake up the monitor. If this check is successful, the state of the E-box depends on the "TV_standby" bit in the NVM. This bit contains the history data about how previously the TV configuration entered the "standby" state (e.g. when this was done by the user (bit= 1), the set will stay in "standby").
- If this check is not successful (e.g. set to standby by user), the E-box will go to "Low Power Standby".

Note: For service, the E-box can work in "Stand-alone" power mode. This is detected via the "Stand alone" bit in the NVM. This bit can be set in the Dealer/Service menu. If this bit is "high", the AYT protocol is not used and no FSP commands are send to the monitor.

If the E-box is switched from "Low Power Standby" to "On", the STANDBY pin of the OTC is pulled "low", the relay switch is closed, and the main supply is started up. When the 5V2 and 8V6 voltages reach their nominal values, the 5V2_PROT and 8V6_PROT are activated. Now:

- The MSP shall be reset first, as this IC can disturb the I2C traffic, when not reset properly.
- Secondly, as the POPOV IC of the DW (F22Rx only) can pull the slow SDA line "low" when the HA signal from the main HIP is not available, all traffic on the slow I2C bus needs to be delayed until the HIP is properly initialised and

- settled. This means a wait state of 100 ms, after the crystal configuration of the HIP has correctly been read out.
- 3. Next, all other ICs are initialised. Now, the E-box is working, but the monitor is still not displaying a picture.
- The HOP switches on the PHI1 loop, the software sets all the necessary video and audio parameters, and enables them.

9.2.3 PSU: Mains Voltage Inlet and Filter

The Mains voltage is provided by inlet 0300, after which it is fused by a T2.5A fuse. The next part, the Mains voltage filter, consists of an LC-common mode filter section. This filter consists of two capacitors (items 2002 and 2004) from both phase and neutral to ground (to reduce the leakage current) and an inductor (5000). Interferences on one of the phases are shorted to ground by these capacitors.

Inductor 5000 also provides a differential-mode filtering with capacitor 2001. Resistor 3003 discharges this capacitor after the Mains voltage is disconnected.

At high voltage peaks (for example, lightning surges) on one of the phases, the resistance of VDR 3002 will be very low, causing fuse 1001 to interrupt. At a lightning surge on both phases with respect to chassis ground, the Mains voltage filter will form a high resistance, through which the voltage will rise very sharply. To prevent flashovers, a spark gap (item 1000) is implemented.

Resistors 3000 and 3001 are connected between neutral and chassis ground. They are required by safety regulations.

9.2.4 PSU: Standby supply

Start up

The Standby Supply operates on the AC voltage from the input filter part, and has to deliver a stable regulated 5 V value. The standby supply is always operational when the AC input voltage is present, even when the POWER switch is in the "off" position.

After a small bridge rectifier and buffer capacitor (D6203/6204 and C2202), the DC voltage is applied to a switched mode power supply. To reduce self-pollution, the rectifiers are bridged by small capacitors (C2200/2201).

Normal Operation

The Standby Supply itself is build around a "TINYSwitch" TNY256. This IC contains the control circuitry and a power MOSFET needed for an Switched Mode Power Supply (SPMS). It uses a simple "on/off" control loop to regulate the output voltage.

The supply for the TNY256 comes via safety resistor R3200, L5200, and L5202.

The +5VSTBY voltage at the secondary side is rectified by D6310 and smoothed by C2311.

By using secondary sensing, a very accurate +5VSTBY voltage and high efficiency is achieved. The sensing circuit uses a TL431 as reference voltage/error amplifier. Optocoupler 7203 and coil 5200 are used for the Mains voltage isolation. When the +5VSTBY output voltage rises, the reference voltage on the TL431 will exceed 2.5 V and the current through this device and the optocoupler LED will increase. By this method, the optocoupler transistor will conduct more. When this current (at pin 4 of IC7200) exceeds 50 μA , the MOSFET is switched "off", and the output voltage will drop. When the current drops below 40 μA , the MOSFET is switched "on" again.

Output Voltage

+5VSTBY, which is available on connector 0307, pin 7.

Protections

As the TNY256 is sensitive for transients, a "peak clamp" circuit (300 V zener diodes 6201 and 6202) is used to limit the voltage to a safe level.

9.2.5 PSU: Main supply

Introduction

The main supply is activated by single-pole relay 1400, which delivers the filtered Mains voltage to a rectifier bridge (item 6000). This rectified voltage is the input for the flyback converter, which generates the output voltages.

The flyback converter is based on a MC44603AP driven in "discontinues conduction mode" with a fixed frequency of 40 kHz (at nominal Mains voltages). The MC44603AP drives a MOSFET (600 V, 1.2 Ohm), which is snubbered (by 2008) and clamped by an RCD peak clamp. The transformer delivers the secondary output voltages and the primary supply voltage for the IC.

Secondary voltage control is on the 5V2 and 8V6 output via a TL431 (item 7011) and an optocoupler (item 7002) back to the error amplifier input of the controller IC.

Output Voltages

The following voltages are generated by the main supply:

- +33V (0307/11) for the Tuner.
- +16V (0306/9).
- +8V6 (0307/8 & 9).
- +7V7 (0306/5).
- -7V7 (0306/6).
- +5V2 (0307/4 & 5).
 +5V2_FB (0307/3).

Start up

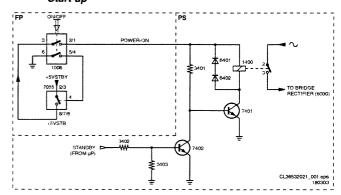


Figure 9-2 Start up circuitry

The mechanical "on/off" switch (item 1006) on the Front panel drives IC7055. This is a "power distribution switch", used due to the high switch-on current. It has internal overload and short-circuit protections.

A single pole 5 V relay (item 1400) will switch the Receiver box from "standby" to "on". It is controlled via the POWER_ON line.

The start up supply voltage of the control IC comes via the standby supply. It is rectified (D6010), smoothed (C2025), and clamped (D6008). Once the main supply is started, this voltage is taken over by winding 6-8 of transformer 5003 and diode D6007.

Normal operation

The working frequency of 40 kHz is determined by R3032 and C2014. The output voltage is controlled by duty cycle regulation. Output is on pin 3, which drives the FET. A current will flow through transformer coil 3-4 (item 5003), FET 7000, and sense-resistors R3012//R3013//R3014 to ground. The energy stored in the primary winding during the on time is delivered to the secondary windings during the "off" time. The output voltages are rectified and buffered here.

Regulation is performed by the control loop that consists of reference component 7011 and optocoupler 7002. When the +5V2 output voltage rises, the reference voltage on the TL431 will exceed 2.5 V and the current through this device and the optocoupler LED will increase. By this method, the optocoupler transistor will conduct more, and the voltage over R3035 (and pin 14 of IC7001) will rise. The IC will adjust the duty cycle, the FET will conduct less, and the output voltage will decrease.

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Protections

Soft Start and Maximum Duty Cycle

The output voltage is 0 V at start up. This would force IC 7001 to start with a maximum duty cycle, causing a very high current through FET 7000. To prevent this, capacitor C2018 (at pin 11 of IC7001) ensures a soft start (voltage at pin 11 is low at start up, which gives a small duty cycle) and R3039 determines the maximum duty cycle.

Switch Off Peak Voltage

To protect the FET against high peak (drain-source) voltages at switch "off", a peak clamp circuit is added consisting of D6014, D6002, C2007, and R3010.

When the FET blocks, the diodes will lead the peak voltages away from the FET and will charge C2007.

When the FET conducts, this capacitor is discharged via R3010, the primary coil, and the FET itself.

Over Current and Fold Back

The current through the primary winding is measured by sense resistors R3012, R3013, and R3014. The resulting voltage is measured at pin 7 of IC7001. Once the voltage at this pin exceeds 1 V (so maximum current is set to 3 A), the duty cycle is regulated back.

If the output load keeps on increasing (I > 3 A), the system is unable to supply enough energy to maintain the output voltage in regulation. This is detected at pin 5 of IC7001 (via pin 8 of 5003, R3015, D6007 and R3037). Consequently, if this voltage drops below the fold back threshold voltage of 1 V, the IC will adapt the "current sense threshold". This will limit the current supply and by this, the output voltage. This will cause an avalanche effect, causing the supply to rapidly trim down.

Over Voltage

When the voltage on pin 6 of IC7001 will exceed 2.5 V, the control IC will stop oscillating (after 2 μ s). The output voltages will drop, and the IC starts again. This can happen when the feedback loop is interrupted.

Demagnetisation

The internal demagnetisation block in IC7001 disables the output (pin 3) during the demagnetisation phase of transformer 5003. This is to prevent the FET from being switched "on". The info is taken from pin 8 of transformer 5003, and fed via R3015 and R3030 to pin 8 of IC7001. When the voltage on this pin drops below 65 mV, the demagnetisation phase is completed, and the FET can switch on.

Audio Plop

The POWER_VALID circuit is designed to detect the disappearance of the Mains voltage (at set switch "off" or at Mains voltage dips). This signal will then mute the audio outputs to prevent audio plops (see diagram AV8 position I7). The circuit compares the +5V2 output with the negative rectified 5V2 winding (which is in fact the transformed rectified Mains voltage). When this voltage disappears, transistor 7101 is activated and the POWER_VALID output will go "low" before the supply output voltages will drop. It will mute the audio outputs and stay "low" until the Mains voltage and the +5V2 output voltage returns.

Switch On/Off Behaviour

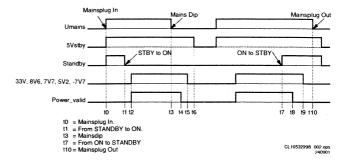


Figure 9-3 Timing diagram Power Supply

The start up of the PSU has to fulfil certain requirements. At the moment the Mains cord is connected (t0), the standby supply will generate the +5VSTBY (coming from the STANDBY pre-condition). With this voltage present, the microprocessor begins the start up procedure, by making the STANDBY command logic "low" (t1) and the POWER_ON command "high" (coming from the "off" pre-condition). After you press the power switch on the front panel, the "POWER_ON" signal will become "high" and within 2 seconds, the main supply will start, making the POWER_VALID signal "high" (t2).

When a Mains dip occurs (t3), the POWER_VALID signal must go "low" before the output voltages will drop and must remain "low" until the Mains voltage returns.

When you put the set in standby, the microprocessor makes the STANDBY signal "high" (t7). The output voltages will drop, and the POWER_VALID signal goes "low", but the +5VSTDBY remains present.

Finally, this voltage will drop when the Mains cord is disconnected (t10).

Typical timing values are:

- t1 t2 = 0.1 < t < 1.2 s (dependent on the STANDBY PSU load).
- t3 t4 = 20 < t < 350 ms (dependent on U_MAINS).
- t4 t5 = 5 < t < 40 ms (dependent on the main PSU load).
- t5 t6 = 10 < t < 1000 ms (dependent on U_MAINS and the STANDBY PSU load).
- t7 t8 = 10 < t < 600 ms (dependent on U_MAINS and the MAIN PSU load).
- t8 t9 = 5 < t < 40 ms (dependent on the MAIN PSU load).

9.3 Audio Video Interface Panel (AVI, diagram AV)

9.3.1 AVI: Introduction

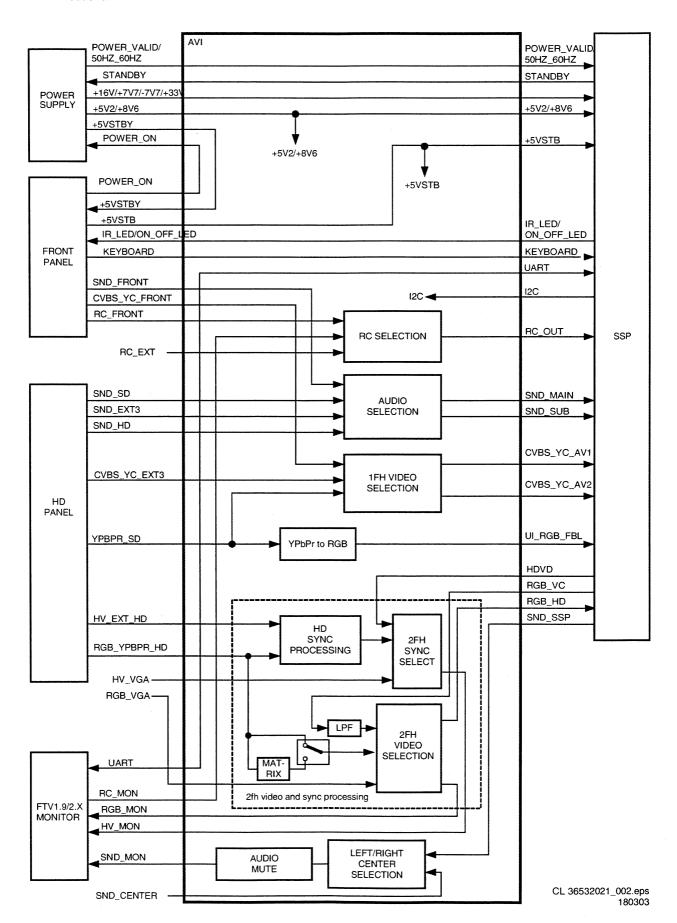


Figure 9-4 Block diagram AVI panel

The AVI contains a video switch, an audio switch, an I/O expander, and an EPLD (or ACEX) with I2C control. The AVI panel is an interface between the following panels/ sources:

- Small Signal panel (SSP).
- Front panel (FP).
- VGA input.
- Standard Definition panel (SD).
- Power Supply panel (PS).

It also contains the outputs to the plasma monitor.

AVI: Video Processing 9.3.2

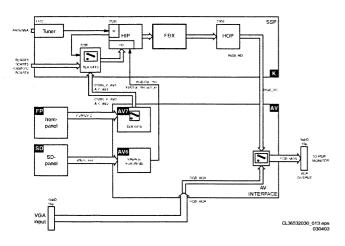


Figure 9-5 Block diagram video processing

1fH CVBS and YC Video Selection (diagram AV7)

For the video source selection, a TEA6415 (item 7710) from SGS-Thomson is used. The main function of this IC is to switch eight video input sources to six outputs. Each output can be switched to only one of the inputs, but any same input may be connected to several outputs. All the switching possibilities are controlled through the I2C bus.

At the input of the IC, we find the following signals:

- CVBS or Y/C from FRONT.
- CVBS or Y/C from EXT3.
- CVBS or Y/C from the Scaler (not used in this chassis).

At the output of the IC we find:

- CVBS_Y_AV1 and C_AV1.
- CVBS_Y_AV2 and C_AV2.

AV1 is connected to the CVBS/YC_FRONT input of the SSP (connector 0333).

AV2 is connected to the CVBS/YC_UI input of the SSP (connector 0372).

These signals go to the SSP via connectors 0333 and 0372, where they are fed to a second TEA6415 (item 7208), together with the video signals coming from the SCART connectors.

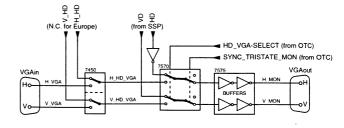
1fH Video processing (diagram AV6)

The YPbPr signals coming from the SD panel (EXT5) are buffered, and then fed through a YPbPr-to-RGB matrix circuit (TSH93, item 7607). The matrix is made with discrete hardware and determined by resistor values.

The RGB_SD output signals are then fed to connector 0372 and routed, via an RGB selector, to the RGB2 (Universal Interface) input of the HIP IC (item 7501) on the SSP.

9.3.3 **AVI: Sync Processing**

General



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Figure 9-6 Block diagram sync processing

The block diagram above shows the sync path. The AV Interface has the following sync inputs:

- Sync from VGA source (HV_VGA)
- Sync from SSP (HD_VD)

The selection between these inputs for the main picture is done with switch 7570. This switch is controlled via software with the HD_VGA_SELECT signal.

Note: If the Receiver box has to function without the monitor (e.g. in case of EPG data download), the H and V pulses may not be fed to the monitor. In this case, switch 7570 will be put open with the SYNC_TRISATE_MON control signal (SW controlled).

9.3.4 **AVI: Audio Processing**

General

The audio-part of the AV-interface consists of three separate parts:

- The source selection.
- The Channel-channel configuration.
- Muting (or anti-plop circuit).

Source Selection

The source selection part redirects the three stereo inputs into two separate channels. These two channels (SNDL/ R MAIN_OUT and SNDL/R_SUB_OUT) are then connected to the SSP for further processing.

Note: The TEA6422 cannot handle the maximum level of 2.8 V of the SNDL/R_VGA signals. Therefore, these signals are attenuated by 3 dB (see R3801/3802 and R3806/3807 on diagram AV8). All other inputs are attenuated at the Front I/O panel or the HD connector panel. These attenuations are corrected again on the SSP.

Centre Channel Selection

The Centre input (cinch at the rear) is a separate audio input. This input bypasses all other inputs, and is designed to obtain a better Home Cinema configuration. In this case, the FTV monitor speakers will function as the centre channel. This input is selected via the CENTER_SELECT signal, which is controlled by the I/O Expander (items IC7880 and TS7853). It is selected by the user from the user menu.

To prevent audio plops and clicks (when the set is turned "on/ off" or at channel switching), a mute circuit is implemented immediately after the centre channel selection part.

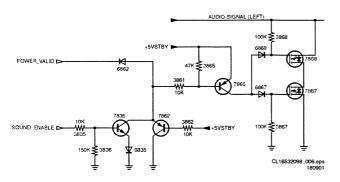


Figure 9-7 Audio mute circuitry

The table below shows how this is done. It is controlled by the following signals:

- POWER_VALID line is a control signal generated by the power supply.
- SOUND_ENABLE line is a control signal coming from the microprocessor on the SSP.
- +5VSTBY line, from the Front panel.

Table 9-2 Truth table audio mute

/ER_VALID (from PSU)	SOUND_ENABLE (from uP on SSP)	STBY (from Front Panel)	AL MUTED
PO	nos	3AG+	SIGN
PO V	nos °	° +5V8	SIGN
0 0 0	nos o	- 0 +5VS	N SIGN
0 0 0	0 0 1	0 1 0	NBIS 1
0 0 0	0 0 1	0 1 0	NSIS 1 1 1
0 0 0 0	0 0 1 1	0 1 0	NSIS 1 1 1 1 1
0 0 0 0 1	0 0 1 1 0	0 1 0 1	1 1 1 1 0
T T D O O O D O D T T T T T T T T T T T	0 0 1 1 0 0 1 1	1 O L O L O +5VSTBY (from Front Panel)	SIGNAL MUTED

When the SOUND_ENABLE signal is high, the two N-channel FETs are conducting the audio signal to the GND, and will mute the audio output.

Why are two FETs implemented? Because in a case of "no mute", and FET 7868 directly connected to ground, the diode in this FET would distort the audio signal too much. With the addition of FET 7867, this distortion is eliminated, because this FET is connected in anti-series.

The supply for the inverter is connected to the +5VSTBY. This supply signal is always available when the Mains is connected. so in case the Mains voltage is disconnected, the mute function is disabled.

9.4 Small Signal Panel (SSP, diagram K)

The SSP is based on the one used in the MG3.1 chassis. It consists of the following parts:

- Control.
- 2. Video: Tuner and IF.
- Video: HIP. 3.
- Video: Feature Box.
- 5. Video: HOP.
- Audio

9.4.1 SSP: Control

The control part can be divided into:

- Set Control
- TXT/OSD
- Remote Control

Set Control

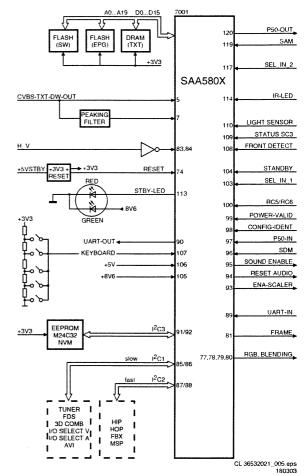


Figure 9-8 Block diagram Control part (μP)

The SAA5801 (IC7003) is called the OTC (OSD, TXT, and Control). In this IC, the microprocessor and the TXT-decoder (or Closed Caption for the USA) are integrated. The SAA5801 is also called the OTC2.5 because also TXT-level 2.5 is supported.

At start up, the RESET signal is generated with TS7006/7007. During a reset, all I/O pins are high. When a RESET is generated, the set is in Standby mode.

The 8V6 and the 5V2 are sensed by pins 105 and 106. If one of them is not present, the Power supply is switched "off". The OTC will generate an error code to indicate what was wrong. The horizontal (HOSD-PIP) and vertical (VD) pulses are also fed to the OTC for stable OSD and CC. To create good stable pulses, these signals are inverted and fed to the OTC. The RGB-outputs (77/78/79) together with fading (pin 80) are fed to the HOP. This fading pin has a double function:

- Make the menu transparent.
- Fast-blanking for CC.

There are three I2C busses used (see section "I2C overview"):

- Slow I2C bus (max. 100 kHz) for tuner, DW, video-, and audio selection.
- Fast I2C bus (max. 400 kHz) for the HIP, MSP, TOPIC, HOP, and FBX (PICNIC, and FALCONIC).
- NVM I2C bus for the Non Volatile Memory to avoid data corruption.

The OTC also has a connection with the Front panel:

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- Driving the "on" and "STANDBY" LEDs. Service tip: The green LED gives a quick indication that the 8V6 voltage is present.
- This chassis has an IR send-LED connected to pin 90 for communication with DST or ComPair.
- The remote control signal comes in on pin 100.

Memory

The set software is in a 4 MB ROM (IC7002) and in a 32 KB ROM inside the OTC. The level at pin 73 of the OTC determines whether this internal software is used at start up. This level is determined with R3026/3029. The external ROM is driven via the OE and CS signals.

The Non Volatile Memory (NVM) IC7008 is a 32 KB version M24C32W6, and is used to store

- Software identification.
- Operational hours.
- Error codes.
- Option codes.
- Presets.
- Alignments.

All ICs in this part are supplied with 3V3. For this, a 3V3 stabilizer is used (IC7009).

Monitor communication (UART/FSP)

In total, four versions of the Receiver box are realised. There is an US and EU version (main difference is the HD part for US). Furthermore, there will be version for the current 42" FTV1.9 monitor and a version for the new FM2x monitor range. The difference between these versions is mainly the communication between the Receiver box and monitor. See table below:

Table 9-3 Overview UART diversity

Conn. 0303	F21R with FTV1.9	F21R with FM2x
Pin 4	Not used	RXDO
Pin 11	CONFIG_IDENT	TXDO
Pin 12	TXDO	Not used
Pin 15	RXDO	Not used

The Receiver box has to support both the FTV1.9 and the FM2x plasma monitors. The communication protocol for the FTV1.9 monitor is based on UART with a CONFIG_IDENT signal. However, all FM2x monitors have a new improved protocol called FSP (FTV System Protocol). Therefore, the pin layout on the FTV monitor output connector has been changed.

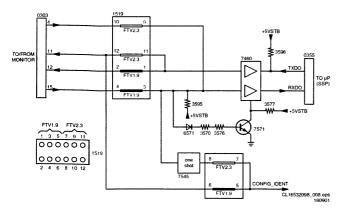


Figure 9-9 Block Diagram UART Circuitry

As the FM2x has no CONFIG_IDENT signal to "wake up" the Receiver box, a "dummy" CONFIG_IDENT is derived from the RXDO signal with the aid of a "one-shot generator" (item 7545). In order to prevent the RXD-line from connecting to ground, a protection circuit is added. This circuit puts the RXD-buffer into tri-state if the input is connected to ground for more than 100

Because the diversity is realized with jumpers (connector 1519), there are no differences in panel stuffing for both versions.

Teletext/On Screen Display (TXT/OSD)

The TXT/OSD-decoder in the OTC gets its video signal directly on pin 5. The RGB-outputs are available on pins 77/78/79. Fast blanking is realized by pin 80. The RAM (IC7001) of the microprocessor is also used for the decoder.

Remote Control

The remote control uses RC6, because commands like "cursor control in eight directions" are used.

For this chassis, there are three possible RC input sources:

- RC_MON (coming from monitor),
- RC_BOX (coming from box), and
- RC_EXT (coming from an external source; this is not

The selection is performed as shown in the figure below:

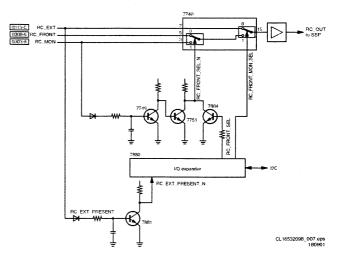


Figure 9-10 Block Diagram RC Selection Circuitry

When CONFIG_IDENT (for FTV1.9) or AYT (for FM2x) is detected, the RC_MON is selected. If there is no monitor connected, the RC_FRONT_SELECT

signal is always "low", so RC _MON cannot be selected (via TS7749 and TS7751). After start up, when the I/O-expander is not yet set via I2C, the RC_FRONT signal is connected to RC_OUT.

9.4.2 SSP: Tuner and IF

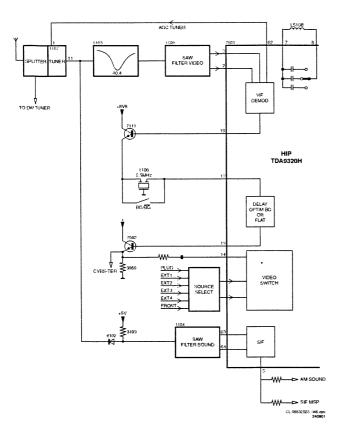


Figure 9-11 Overview Tuner and IF Part

Normally for chassis with the Double Window feature, a splitter is used. This splitter is on the chassis, beside the main tuner. From this splitter, the aerial signal is fed to the main tuner on the SSP and the DW tuner on the DW panel (which is not present in this chassis). Therefore, the aerial input is on the splitter.

The tuner part contains a tuner and an oscillator-mixer. The tuner is I2C controlled. The reference voltage at pin 9 is 33 V. This voltage (V_TUN) is derived from the secondary side of the standby supply. The OTC, together with the HIP, controls the tuning procedure.

The frequency of the local oscillator is compared with the frequency of a reference oscillator by a PLL. The varicap voltage is changed via I2C, and that changes the frequency of the reference oscillator.

For the higher frequencies, the tuning speed is increased by increasing the current that changes the varicap voltage.

The IF-part can be split into two important parts:

- The IF-filter.
- 2. The IF-amplifier and demodulator.

The IF signal is fed to a SAW filter (item 1109 for the video and 1104 for the audio). The output of this filter is fed to the HIP for demodulation. The demodulator is PLL-controlled via a VCO. This VCO is I2C controlled (Service Alignment Mode IF-AFC alignment). Tuning of the VCO is possible by switching some small capacitors parallel to L5108. These capacitors are integrated in the HIP.

In addition, the AGC takeover point is I2C controlled (with the SAM menu).

Service tip: If the AFC is **not** adjusted **correctly**, very strange faults can occur: like spontaneous standby switching, cracking sound, incorrect CC, etc.

The demodulated video signal is available at pin 10, and then fed to a sound-trap. This is for filtering the rest sound carrier. Then the group delay time (system dependent) can be adapted, and at pin 13 of the HIP, the CBVS is available for further processing in the set.

The tuner-IF signal is also fed to a second SAW filter for the sound. At pin 5 of the HIP, the IF-sound is available. This signal is fed to the MSP for further processing (the IF-sound is demodulated by the MSP3410).

9.4.3 SSP: HIP (High-end Input Processor, diagram K1)

Introduction

The HIP (IC7501, TDA9320H) has the next functions:

- Source selection.
- Video IF-demodulation.
- · Luminance, chrominance, and sync processing.

Inputs

The set has a total of five external inputs (AV1 - 5).

The HIP has an integrated source selector, which can handle:

- 3 CVBS inputs.
- 2 Y/C inputs.
- 2 RGB inputs.

The HIP detects whether the input is Y/C or CVBS and decides what to do. There are two inputs (pins 39 and 40) for detection of the RGB status. The other status voltages are checked by the OTC.

Video Processing

- The video identification block monitors whether a video signal is detected at one of the inputs. The Y/C switch detects whether the input is CVBS or Y/C, and switches these signals for luminance and chrominance processing. If a comb filter is used, the HIP detects they are "combed", and the YC switch will select the signals for the comb filter. The comb filter can be switched to the right system via the two system lines (SYS1 and SYS2) from the HIP.
- If the input signal is CVBS, then an internal colour trap is used in the Y path.
- The Y-delay can be controlled via the service menu to match the colour to the luminance (because of different signal paths there are different timings)
- Via the RGB-matrix, external RGB-signals are converted to YUV, for further 2fH conversion.
- The internal YUV switch switches between the demodulated video signal and an external RGB source.
- The sync processor in the HIP provides H_A and V_A sync signals for the Feature Box. This sync part is alignment free, but it should be noted that the line oscillator is locked with the colour oscillator.

Note: If the quartz crystal is defective, there will be no colour and synchronization problems. This crystal is very precise: if it is replaced by another type, there may be no colour, because of a different capacity. Therefore, you must use the genuine replacement part.

Outputs

The HIP has the following outputs:

- YUV (50 Hz), for further picture processing on pins 49, 50 and 51.
- CVBS-DW, video signal for the Double Window module (if present) on pin 32.
- CVBS-SC2-OUT, monitor output (WYSIWYR = What You See Is What You Record).
- CVBS-TXT-OUT, CVBS for TXT and Comb filter.
- CVBS-TER, video signal from the tuner is fed to the I/O switching and to EXT1 on pin 19 of SCART.

SSP: Feature Box (FBX, diagram L)

Introduction

The basic function of the Feature Box (FBX) is picture improvement, and depending on the version, several scan

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conversion methods are possible. The PICNIC (SAA4978H) is the central key component.

Block diagram

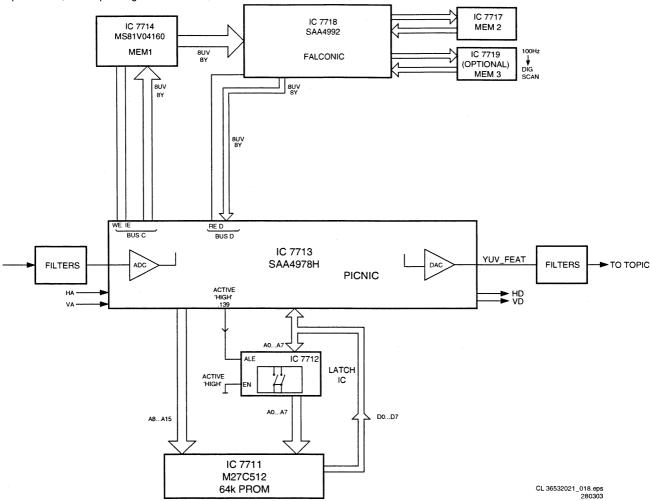


Figure 9-12 Block Diagram FBX7

The 50 Hz YUV signals, coming from the HIP, are fed to the PICNIC via an anti-aliasing filter.

The (AABB) "frame frequency doubling" is done by the PICNIC (SAA4978, 160 pins QFP) together with a field memory (MEM1). The PICNIC can handle most 100 Hz functions (except Progressive Scan).

Via bus "C", a digitalized signal is presented to MEM1 (Field Memory 1), which is used for the 50 to 100 Hz conversions. The signal goes further via the data-bus to the FALCONIC. This IC has the following functions:

- Line flicker reduction.
- Digital Noise Reduction (DNR).
- Progressive scan.

It has an internal CPU and a (small) integrated ROM. The actual FBX7 software is located in an external ROM (item 7711). In order to limit the number of connections between the PICNIC and the external ROM, a number of lines are used twice. The lines A8 to A15 are fixed lines, while the lines A0 to A7 are made switchable with the eight data lines of the ROM. This is done via a Latch (item 7712), which is controlled by pin 139 of the PICNIC (the ALE signal).

At the end, the digital YUV (YUV_FEAT) signals from the PICNIC (pins 12, 14, and 15) enter the TOPIC. This IC has the following functions:

- Luminance Transient Improvement (LTI).
- Peaking.
- Colour transients (CTI) and colour enhancement (TOPIC).

The digital YUV-signals from the PICNIC go, via a passive output filter, to the TOPIC and then to the HOP.

PICNIC (Diagram L1)

The PICNIC has the following functions:

- ADC/DAC.
- Interlaced to progressive scan conversion.
- Dual screen compression
- The Panorama mode.
- Automatic Aspect Ratio Adaptation (AARA)
- Colour Transient Improvement (CTI)
- The contrast improvement (Dynamic Contrast).

All these functions are integrated in one IC: the SAA4978H, 160 pins QFP.

ADC/DAC

- Analogue to Digital conversion is done with three identical 9-bit ADCs.
- Digital to Analogue conversion uses three identical 10-bit DACs.

In the PICNIC, there are three nine-bit ADCs present for Y, U, and V. For digitising the Y (luminance), nine bits are used (to realize a more detailed picture). These nine bits are only internally used. Via dithering, the nine bits are reduced to eight bits and this data is stored into memory. The data in the memory is fed back to the PICNIC and via un-dithering the data is again reproduced to nine bits for processing.

U/V (colour difference signals) is also sampled with nine bits. These two nine bit data streams are multiplexed to four bit data streams. As the perception of colours by the human eye is less sensitive to luminance, this reduction is allowed.

Interlaced to progressive scan conversion

The main function of the PICNIC is the "Analogue to Digital" conversion, spatial noise reduction, histogram functions (like Dynamic Contrast and Black Stretch) for YUV, and HV-sync processing. Also, the line frequency is doubled. De-interlacing itself is realized in the FALCONIC (Field And Line CONverter IC).

Further features of the PICNIC:

- Dual Screen Compression. The PICNIC can provide horizontal video compression up to 50 %. The compress mode can be used to display dual screens.
- The Panorama Mode. To fit 4:3 pictures into a 16:9 display, it is possible to apply a panoramic horizontal distortion, to make a screen-fitting picture without black sidebars or lost video. The centre horizontal gain is programmable and the side gain is automatically adapted to make a screen-fit.
- Automatic Aspect Ratio Adaptation (AARA). This
 feature uses data from the "black bar detection circuit" to
 adapt the vertical and horizontal amplitude to an aspect
 ratio belonging to the display, without the black bars.
- Dynamic Contrast. To make the contrast (black/white) range wider, Philips has invented Dynamic Contrast. It uses the digital memory used in 100 Hz sets. It measures every A-field (25 x per second), and digitally analyses where on the greyscale most of the image is located. If it is a relatively dark image, the lighter part of that image is stretched towards white, so that more contrast will become visible in that picture. If it is a relatively light image, the darker part of that image is stretched towards black, so that these darker parts will have more contrast. When the image is in the middle of the greyscale, both dark and light parts are stretched.

FALCONIC (Diagram L3)

Besides "Natural Motion", The FALCONIC (Field And Line CONverter IC) has the following functions:

- Line flicker reduction (Digital Scan).
- Noise reduction (DNR, Dynamic Noise Reduction).
- Vertical Zoom.
- Movie phase detection.
- · Progressive scan.
- Variable vertical sample rate conversion.
- Synchronous No parity Eight bit Reception and Transmission interface (SNERT).

422 processing

The FALCONIC can do "422" processing. This means eight data lines for Y and eight data lines for U/V (844 = 422). Therefore, the bandwidth for the colour difference increases: the bandwidth for Y remains 6 MHz, and the bandwidth for colour difference is now 3 MHz. This means that the picture for DVD is much better. For this extra bandwidth, an extra field memory is used: IC7640.

Improved motion detection (Natural Motion)

This set utilizes AB'A'B scanning, a new sample for Natural Motion.

The FALCONIC has an extra advantage for motion detection: the maximum number of pixels that can be followed in AB'A'B scanning is higher: This produces a more natural motion, even with very fast movements.

Improved line flicker reduction (Digital Scan)

The FALCONIC offers motion compensated line flicker reduction. This virtually leads to complete elimination of line flicker.

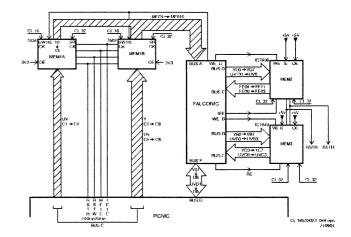


Figure 9-13 Block Diagram Digital Scan

Bus A is the input bus for the FALCONIC. The data comes from the two memory ICs (IC7602 and 7634) and the FALCONIC will cluster this data. It is possible to connect two field memories to the FALCONIC. The output of the FALCONIC is fed back to the PICNIC via bus D.

The FALCONIC has two possible configurations:

- Economy mode: In this mode, only Field Memory 2 is mounted (saving the cost of Field Memory 3). In this configuration, the full frame store can be made by a factor 2 data compression, using 2 dimensional DPCM techniques. This results in a performance with more quantisation noise, while maintaining improved MEMC quality. In this case, a full "422" processing cannot be achieved. Only the 422-DPCM is possible.
- Full functionality mode: This configuration uses Field Memory 2 and 3. Therefore, no picture performance concessions are made here. In this mode, all FALCONIC features can be applied optimally. However, to be able to perform full "422" processing, the FM1 must be extended with an extra 4 bits, for a total of 16 bits.

Power Supply and RESET Circuit

Besides the two incoming voltages, 8V6 and 5V2, two stabilizers (for power consumption reasons) are used for the 3V3 (3V3A and 3V3B).

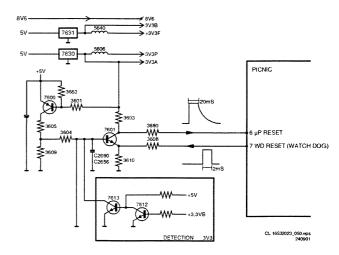


Figure 9-14 Block Diagram Reset Circuitry

Via the reset circuit (TS7600/TS7601) a pulse of 20 ms is generated for the μ P (in the PICNIC) and for the ROM. After power "on", the 3V3 is built up, which is derived from the 5V2. As long as the 5V2 is below the 3V3, the 3V3 follows the 5V2.

TS7600 blocks and so does TS7601. The voltage on pin 6 of IC7611 increases in the same way as the 3V3.

F21RE AB

If the 5V2 rises above 3V3, the 3V3 stabilizes and TS7600 starts to conduct. Capacitors C2656//C2690 are charged by R3604 and R3605. At a voltage of 0.6 V, TS7601 will conduct and the voltage at pin 6 of IC7611 becomes low again. The (P

If the PICNIC cannot communicate with the ROM, a reset is generated by the watchdog. Pin 7 of the PICNIC generates a pulse to create a new reset pulse for pin 6.

If one of the two supply voltages (3V3A, 3V3B) is absent, a safety problem could occur. The 3V3A is the supply voltage for the PICNIC and the 3V3B for the FALCONIC. If the 3V3 is too low, the base of TS7601 will be low via TS7612 and TS7613. If the base of TS7601 is made low, a RESET signal is generated for the PICNIC.

SSP: TOPIC and HOP (Diagram K6)

Introduction

The TOPIC (The most Outstanding Picture improvement IC, item 7402, type TDA9178), is an (optional) IC between the PICNIC and the HOP. It has the following (picture improvement) functions:

- Luminance Transient Processor (LTP), for detail enhancement.
- Chrominance delay circuitry, to compensate timing differences between Y and C.
- Spectral processor, for improved sharpness and colour transient improvement (CTI).
- Colour vector processor, for skin tone correction, green enhancement and blue stretch.
- Measure and detection circuitry, for AutoTV.

The sandcastle pulse from the HOP (High end Output Processor), is fed to pin 1 of the TOPIC, which is used as reference for timing.

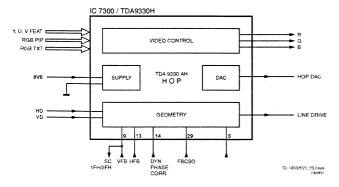


Figure 9-15 Block diagram HOP

The video processor and digital deflection processor are integrated in the HOP (IC7300, TDA9330H). Its main functions are:

- RGB interface for OSD/CC.
- Control of saturation, contrast, and brightness.
- Black/blue stretch.

After input selection, the YUV input is converted to RGB outputs. The RGB and fast blanking from the OTC (OSD and CC) are inserted on pins 35 - 38.

Blue stretch, measures the amplitude of the three RGB signals. If one of these colour signals reaches more than 80% of the nominal value, the amplification of Red and Green decreases. This is to achieve a higher colour temperature.

The RGB outputs are available at pins 40 - 42. They are buffered and fed to connector 0340, which goes to the AVinterface.

SSP: Audio processing

Introduction

The sound processing is distributed between the Flat Monitor (amplifier) and the Receiver Box (processing). The sound processing in the Receiver Box is completely done by the: MSP 3410D: demodulation for Europe and AP (including NICAM), or

MSP 3440G: demodulation for US/LatAm/Taiwan (this IC also covers Korean stereo).

The MSP ICs contain audio processing, used for the basic L/R stereo sound. This processing involves bass, treble (via the equalizer), and balance (trim speakers). The volume is set to a fixed value, because the volume control is done in the monitor

With the user interface, audio selection can be "mono", "stereo", or "surround" mode (surround mode will give spatial functionality). Stereo and spatial is only possible if a stereo

All the extra audio sources, compared with the SSP, can be used in the main channel. The "Centre" input is available on the AV-interface panel. With this input, it is possible to use the monitor left and right speakers as a centre speaker in a home cinema configuration. This input can be selected via the User Interface

For VGA it is not possible to select the "Centre" input, because the E-box OSD is not working for VGA inputs.

The selection of the possible inputs is divided over two separate panels: the SSP and the AVI panel. The input configuration dependents on the E-box version (in combination with a TEA6422 (item 7777), the MSP is also used for a part of the source selection in the E-box).

Table 9-4 Audio I/O overview

Audio inputs and outputs (EU/AP)	Location
RF input	SSP
EXT1= SCART1 L/R-in and L/R-out	SSP
EXT2= SCART2 L/R-in and L/R-out	SSP
EXT3= SCART3 L/R-in	SSP
EXT4= SCART4 L/R-in	SSP
SD L/R (YPbPr-1fH)	SD panel
VGA L/R-in	AVI panel
Center audio in	AVI panel
Front L/R-in	Front panel
VGA audio out for FTV monitor L/R-out	AVI panel
CL-out for a Dolby audio receiver	SSP
Headphone out L/R	Front panel

Front Panel (FP, diagram FP) 9.5

9.5.1 General

This panel serves as an interface with the "outside world", and has the following inputs/controls/indicators:

- Power switch.
- Power LFD
- Audio L/R in.
- Video CVBS in.
- Video SVHS in.
- Headphone out.
- IR send-LED and receiver-LED (for Service).
- IR receiver (for Remote Control).
- Control buttons for MENU, PROGRAM, and VOLUME.

9.5.2 Audio path

Front audio inputs (SNDL/R_FRONT) are connected to the TEA6422 (item 7810) on the AV-Interface.

The headphone output signal (DS_AUDIO_L/R) from the DW module is routed to the front panel.

9.6 **Auto TV**

The Auto Picture Control (or AutoTV) aims at giving the customer the best possible picture performance at any time. Therefore, it does a real time processing of the video signal and, as a result, it decides to adapt several video parameters throughout the whole chassis. The user can choose the total effect of the Auto Picture Control on the screen via the remote control.

AutoTV consists of a set of algorithms that perform the following tasks:

- Auto Noise Reduction:
 - Input: noise measurement done in PICNIC.
 - Output: noise reduction of PICNIC, coring of PICNIC, TOPIC (if present), or EAGLE (if present).
- Auto Sharpness:
 - Input: steepness information and band energy in PICNIC.
 - Output: sharpness settings in PICNIC, TOPIC (if present), or EAGLE module (if present).
- Auto Ambient Light (in combination with histogram):
 - Input: light sensor information (from TV monitor).
 - Output: is depending on the user setting of Active Control. If "maximum", saturation and contrast of the HOP and histogram settings in PICNIC. If "medium", only HOP saturation and PICNIC histogram.
- Auto colour:
 - Input: user smart mode choice.
 - Output: colour features of the EAGLE (or TOPIC), like green enhancement and skin tone correction.

The FTV E-Box has no own light sensor, instead they is featured in the TV monitors. The E-box is involved in the image control loop for these light sensors. The 42" F19D and 50" FM25 monitor do not have a light sensor.

The user can select four different settings: OFF, MIN, MED and MAX. The setting does not change the amount of the influence of the algorithms on the screen, but partly switches algorithms ON (see table below).

Table 9-5 Active Control settings

Active Control	OFF	MIN	MED	MAX	ON (**)
Auto Ambient	off	off	on (*)	on	off
Auto Color	(***)	(***)	(***)	(***)	(***)
Auto Histogram	on	on	on	on	on
Auto Sharpness	on	on	on	on	on
Auto Noise	off	on	on	on	on

- (*) In MEDIUM, the monitor contrast coupling of ambient is not
- (**) When the light sensor is not present, ambient light control is not possible and the setting of the AutoTV button is limited to OFF/ON.
- (***) Independent of Active Control is OFF/MIN/MED/MAX. Dependent of colour enhancement setting (in picture menu) and smart picture mode.

9.7

•	Abbreviation list	
	ADC	Analogue to Digital Converter
	AM	Amplitude Modulation
	AP	Asia Pacific
	ATSC	Advance Television Systems
		Committee
	AV	External Audio/Video
	AVI	Audio and Video Interface
	B/G	Monochrome TV system. Sound
		carrier distance is 5.5 MHz
	BTSC	Broadcast Television Standard
		Committee. Multiplex FM stereo sound
		system, originating from the USA and used in LATAM and AP-NTSC
	CD A	Circuit Roard Assembly (Printed
	CBA	Circuit Board Assembly (Printed Circuit Board)
	ComPair	Computer aided rePair
	CSYNC	Composite SYNC
	CVBS	Composite Video Blanking and
	0,00	Synchronization
	DAC	Digital to Analogue Converter
	D/K	Monochrome TV system. Sound
		carrier distance is 6.5 MHz
	DFU	Directions For Use: owner's manual
	DNR	Dynamic Noise Reduction
	DRAM	Dynamic RAM
	DSP	Digital Signal Processing
	DTS	Digital Theatre Sound
	DVD	Digital Video Disc
	DW	Double Window
	E-box	Electronic box (Receiver box)
	EEPROM	Electrically Erasable and
	EU	Programmable Read Only Memory EUrope
	EXT	EXTernal (source); entering the set by
	LAI	SCART or cinch (jack)
	FALCONIC	Field And Line CONverter IC
	FBX	Feature BoX
	FLASH	FLASH memory
	FM	Field Memory or Frequency
		Modulation
	FSP	FTV System Protocol
	FTV	Flat TV (plasma screen)
	HD	High Definition
	HFB	Horizontal FlyBack
	HP	HeadPhone
	ı	Monochrome TV system. Sound
	100	carrier distance is 6.0 MHz
	12C	Integrated IC bus
	128	Integrated IC Sound bus
	IF Interlaced	Intermediate Frequency Scan mode where two fields are used
	Interlaced	to form one frame. Each field contains
		half the number of the total amount of
		lines. The fields are written in "pairs",
		miles. The holds are written in pails,

causing line flicker.

IR Infra Red IRQ Interrupt ReQuest LATAM LATin AMerica Light Emitting Diode LED

L/L' Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band

I, L is all bands except for Band I

LS LoudSpeaker

M/N Monochrome TV system. Sound

carrier distance is 4.5 MHz

MOSFET Metal Oxide Semiconductor Field

Effect Transistor

MPEG Motion Pictures Experts Group

NC Not Connected

YPbPr

Component video (Y= Luminance, Pb/ Pr= Colour difference signals)

100 0	F21RE AB Circuit Descrip
100 9.	F21RE AB Circuit Descrip
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital
NTSC	sound system, used mainly in Europe. National Television Standard
NISC	Committee. Colour system used
	mainly in North America and Japan.
	Colour carrier NTSC M/N = 3.579545
	MHz, NTSC 4.43 = 4.433619 MHz
	(this is a VCR norm, it is not transmitted off-air)
NVM	Non-Volatile Memory: IC containing
	TV related data (for example, options)
OC OSD	Open Circuit
P50	On Screen Display Project 50 or Easy Link
PAL	Phase Alternating Line. Colour system
	used mainly in Western Europe
	(colour carrier = 4.433619 MHz) and South America (colour carrier PAL M =
	3.575612 MHz and PAL N = 3.582056
	MHz)
PCB	Printed Circuit Board
PCM PICNIC	Pulse Code Modulation
PICINIC	Picture Improvement Combined Network IC
PIP	Picture In Picture
PLL	Phase Locked Loop. Used, for
	example, in FST tuning systems. The customer can directly provide the
	desired frequency
Progressive Scan	Scan mode where all scan lines are
	displayed in one frame at the same
	time, creating a double vertical resolution.
RAM	Random Access Memory
RC	Remote Control transmitter
RC5	Remote Control system 5, the signal
RGB	from the remote control receiver Red, Green, and Blue
RGBHV	Red, Green, Blue, Horizontal sync,
	and Vertical sync
ROM	Read Only Memory
RXD SCART	Receive Data (UART) Syndicat des Constructeurs
	d'Appareils Radiorecepteurs et
	Televisieurs
SCAVIO	Scaler Control Audio Video Input and
SCL	Output Serial CLock I2C
SD	Standard Definition
SDA	Serial DAta I2C
SDRAM SECAM	Synchronous DRAM SEequence Couleur Avec Memoire.
OLOAW	Colour system used mainly in France
	and Eastern Europe. Colour carriers =
01400	4.406250 MHz and 4.250000 MHz
SMPS SND	Switch Mode Power Supply SouND
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
SSP	Small Signal Panel
STBY SVHS	STandBY Super Video Home System
SW	SoftWare
THD	Total Harmonia Distortion

TeleteXT

Transmitter

Microprocessor

improvement IC

Total Harmonic Distortion

Transmit Data (UART)

Video Cassette Recorder

Video Graphics Array

The most Outstanding Picture

Universal Asynchronous Receiver

THD

TXD

TXT

uΡ

VCR

VGA

UART

TOPIC

Y/C Luminance (Y) and Chrominance (C) signal YUV Component video 0/6/12 SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6= play 16:9 format, 12 = play 4:3 format 480i 480 visible lines, interlaced 480p 480 visible lines, progressive scan 1080i 1080 visible lines, interlaced 1080p 1080 visible lines, progressive scan

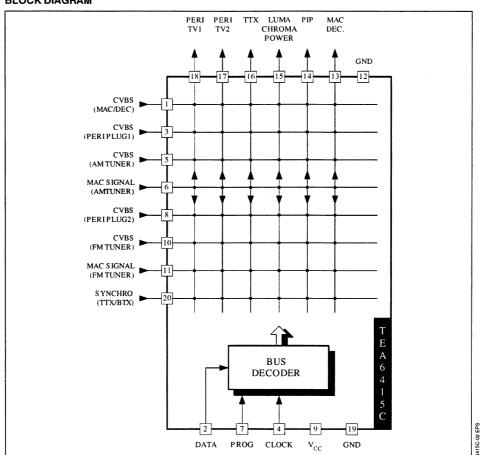
9.8 **IC Data Sheets**

In this section, the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of the "memory" and "logic" ICs) are given.

9.8.1 Diagram AV7, TEA6415 (IC7710)

TEA6415C

BLOCK DIAGRAM



GENERAL DESCRIPTION

The main function of the IC is to switch 8 video input sources on 6 outputs.

Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of synch. top for CVBS or black level for RGB signals).

Each nominal gain between any input and output is 6.5dB. For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, 5 V_{DC} on the input. Each input can be used as a normal input or as a MAC or Chroma input (with external resistor bridge). All the switching possibilities are changed through the BUS.

Driving 75Ω load needs an external transistor.

It is possible to have the same input connected to several outputs.

The starting configuration upon power on (power supply: 0 to 10V) is undetermined.

In this case, 6 words of 16 bits are necessary to determine one configuration. In other case, 1 word of 16 bits is necessary to determine one configura-





TEA6415C

BUS-CONTROLLED VIDEO MATRIX SWITCH

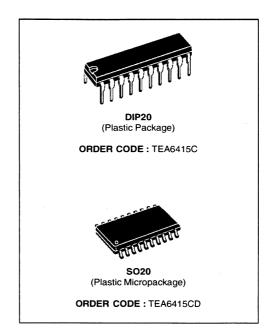
- 20MHz BANDWIDTH
- CASCADABLE WITH ANOTHER TEA6415C (INTERNAL ADDRESS CAN BE CHANGED BY PIN 7 VOLTAGE)
- 8 INPUTS (CVBS, RGB, MAC, CHROMA, ...)
- 6 OUTPUTS
- POSSIBILITY OF MAC OR CHROMA SIGNAL FOR EACH INPUT BY SWITCHING-OFF THE CLAMP WITH AN EXTERNAL RESISTOR BRIDGE
- BUS CONTROLLED
- 6.5dB GAIN BETWEEN ANY INPUT AND OUT-PUT
- -55dB CROSSTALK AT 5MHz
- FULLY ESD PROTECTED

DESCRIPTION

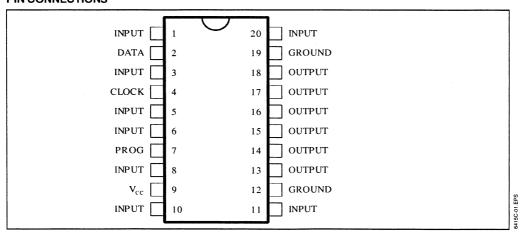
The main function of the TEA6415C is to switch 8 video input sources on the 6 outputs.

Each output can be switched to only one of the inputs whereas but any same input may be connected to several outputs.

All the switching possibilities are controlled through the $\mbox{\rm I}^2 \mbox{\rm C}$ bus.



PIN CONNECTIONS



January 1996

1/10

Diagram C0, TDA8315T (IC7109)

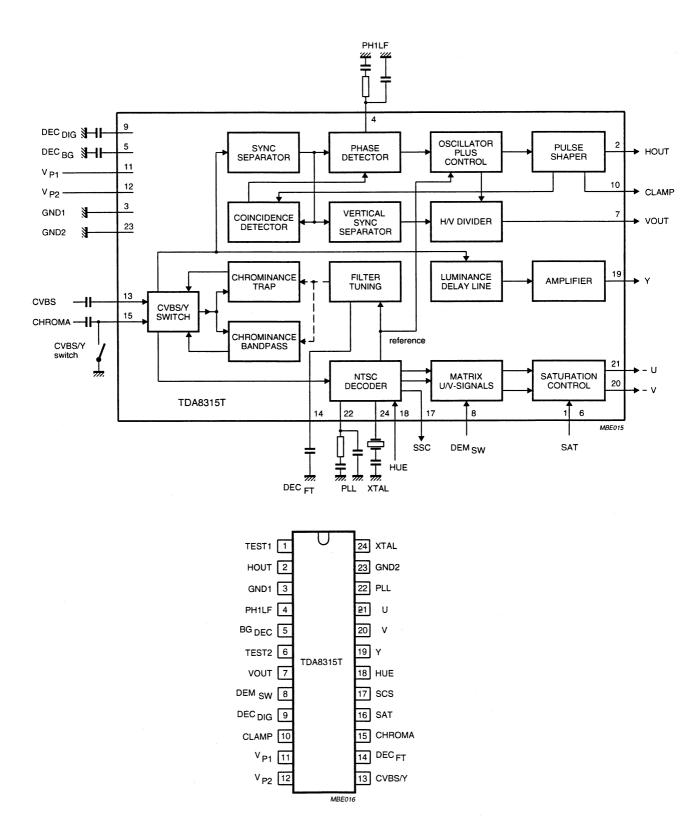


Figure 9-18 TDA8315T Internal Block Diagram and Pin Layout TDA8315T (NTSC Decoder)

3.8.3 Diagram L3, FALCONIC (IC7626)

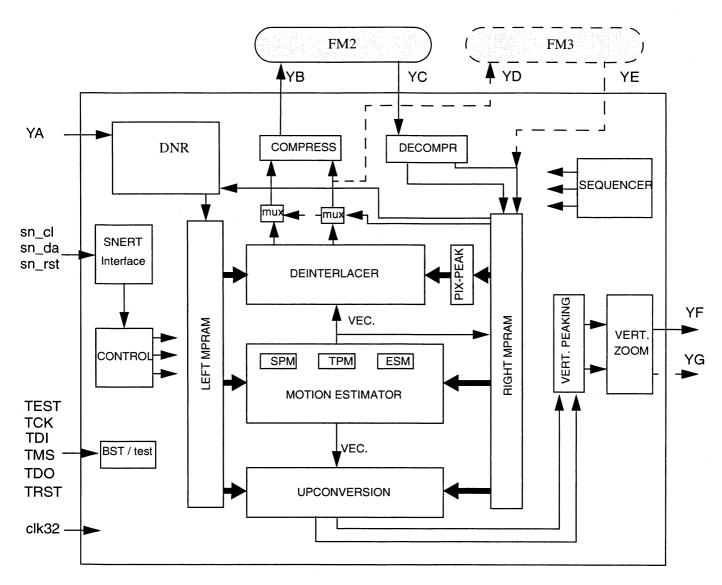


Figure 9-19 SAA4992 Internal Block Diagram SAA4992 (FALCONIC)

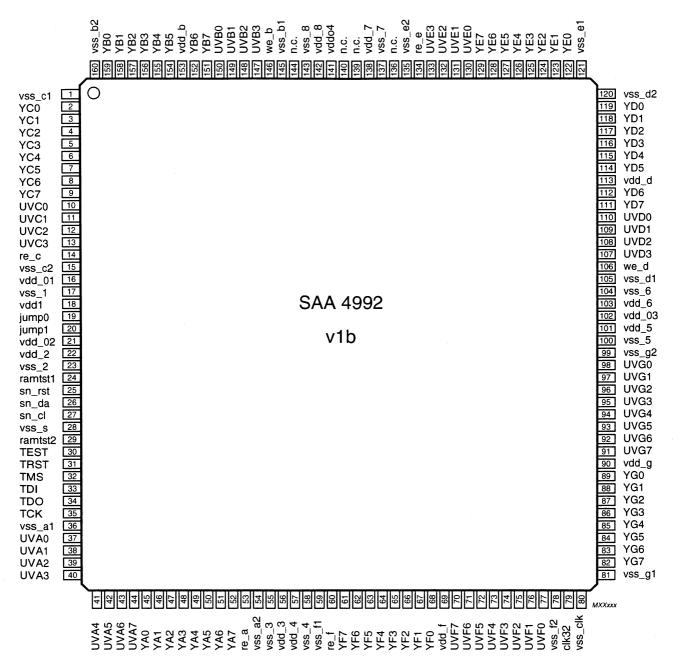
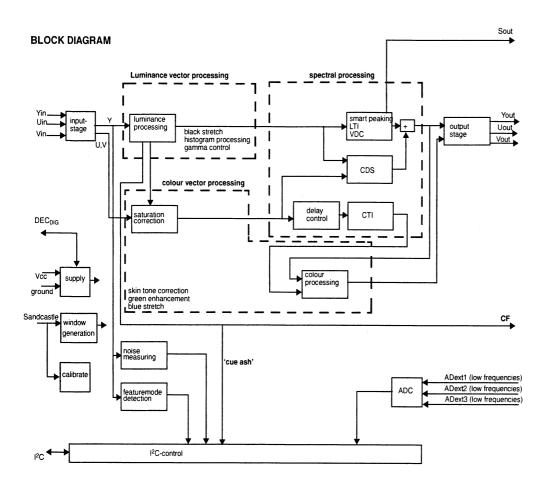


Figure 9-20 SAA4992 Pin Layout SAA4992 (FALCONIC)

Diagram K6, TOPIC (IC7402) 9.8.4



PINNING

SYMBOL	PIN	DESCRIPTION
SC	1	sandcastle input
NC	2	not connected
ADEXT1	3	ADC input 1
ADEXT2	4	ADC input 2
ADEXT3	5	ADC input 3
YIN	6	luminance input
ADR	7	address selection input
UIN	8	colour U input
VIN	9	colour V input
TP	10	test pin
SCL	11	serial clock input (I ² C-bus)
NC	12	not connected
NC	13	not connected
SDA	14	serial data input/output (I ² C-bus)
DEC _{DIG}	15	decoupling digital supply
VOUT	16	colour V output
UOUT	17	colour U output
V_{EE}	18	ground
YOUT	19	luminance output
V _{CC}	20	supply voltage
SOUT	21	scavem output
CF	22	cue ash output
NC	23	not connected
NC	24	not connected

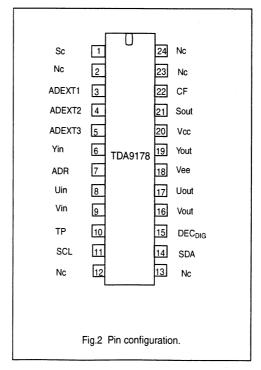


Figure 9-21 Internal Block Diagram and Pin Layout TDA9178 (TOPIC)

10. Spare Parts List

```
AV Interface [AV]
                                                          4822 126 14076 220nF 25V, 20%
                                                                                                     3559
                                                                                                            4822 117 11927
                                                                                                                            75Ω 1% 0.1W
                                                  2724
                                                          4822 126 14076 220nF 25V. 20%
                                                                                                     3560
                                                                                                            4822 117 11927
                                                                                                                            750.1% 0.1W
                                                          4822 126 14076 220nF 25V, 20%
                                                                                                            4822 117 11927
                                                  2725
                                                                                                     3561
                                                                                                                            75Ω 1% 0.1W
Various
                                                  2727
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
                                                         5322 122 32269
                                                                         6.8pF 5% 50V
                                                                                                     3562
                                                                         6.8pF 5% 50V
                                                  2729
                                                          5322 122 32269
                                                                                                     3563
                                                                                                            4822 117 11373
                                                                                                                            100\Omega 1% 0805
       3122 121 67161 Earth sheet
                                                          4822 126 14585
                                                                         100nF 10% 50V
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
                                                                                                     3564
       3122 121 67161
                      Earth sheet
                                                                         10μF 20% 16V
                                                  2748
                                                          4822 124 23002
                                                                                                     3565
                                                                                                            4822\ 051\ 20471\ 470\Omega\ 5\%\ 0.1W
0301
       2422 025 16984 Connector 15P F
                                                  2761
                                                          4822 126 13482
                                                                         470nF 80/20% 16V
                                                                                                     3566
                                                                                                            4822 051 20471 470Ω 5% 0.1W
0302
       2422 026 05248 Socket cinch 3P h Bk/Wh/Rd
                                                                         470nF 80/20% 16V
                                                                                                            4822 051 20471
                                                                                                                            470Ω 5% 0.1W
                                                          4822 126 13482
                                                                                                     3567
                                                  2765
0303
                      Connector 15P F
       2422 025 16984
                                                                                                            4822 051 20223 22k 5% 0.1W
                                                          5322 122 32531
                                                                         100pF 5% 50V
                                                  2801
                                                                                                     3568
0304
       4822 267 10962
                      Connector 11P m v 2.50 Wh
                                                          5322 122 32531
                                                                         100pF 5% 50V
                                                                                                            4822 117 10833
                                                                                                                            10k 1% 0.1W
                                                  2805
                                                                                                     3569
                       Connector 11P m v 2.50 Wh
       4822 267 10962
                                                  2810
                                                          5322 124 41945
                                                                         22μF 20% 35V SMD
                                                                                                     3570
                                                                                                            4822 051 10102
                                                                                                                            1k 2% 0.25W
0306
       4822 267 10974
                      Connector 9P m v 2.50 Wh
                                                  2811
                                                          4822 126 14585
                                                                         100nF 10% 50V
                                                                                                     3571
                                                                                                            4822 117 10834 47k 1% 0.1W
                      Connector 11P m v 2.50 Wh
0307
       4822 267 10962
                                                  2812
                                                         5322 124 41945 22µF 20% 35V SMD
                                                                                                     3572
                                                                                                            4822 117 10834 47k 1% 0.1W
                       Connector 11P m v 2.50 Wh
0308
       4822 267 10962
                                                          4822 124 23002
                                                                         10µF 20% 16V
                                                                                                            4822 117 10833
                                                                                                                            10k 1% 0.1W
                                                  2813
                                                                                                     3573
       4822 267 10979
0309
                      Connector 9P m v 2.50 Bk
                                                          4822 124 23002
                                                                                                            4822 051 20472
                                                  2814
                                                                         10μF 20% 16V
                                                                                                     3574
                                                                                                                            4k7 5% 0.1W
                       Connector 9P m v 2.50 Rd
0310
       4822 267 10964
                                                  2819
                                                          4822 124 23002
                                                                         10μF 20% 16V
                                                                                                     3575
                                                                                                            4822 117 10833 10k 1% 0.1W
0313
       2422 026 05247
                       Socket cinch 3P h Or/Wh/Rd
                                                  2820
                                                          4822 124 23002
                                                                         10μF 20% 16V
                                                                                                     3576
                                                                                                            4822 117 10834 47k 1% 0.1W
0315
       4822 267 10979
                      Connector 9P m v 2.50 Bk
Connector 11P m v 2.50 Bk
                                                          4822 124 23002
                                                                         10µF 20% 16V
                                                                                                            4822 117 11507
                                                                                                                            6k8 1% 0.1W
                                                  2821
                                                                                                     3577
       4822 267 10981
0328
                                                                                                            4822 117 11373
                                                          4822 124 23002
                                                                         10µF 20% 16V
                                                                                                                            100\Omega 1% 0805
                                                  2826
                                                                                                     3578
       4822 267 10962
0333
                      Connector 11P m v 2.50 Wh
                                                          4822 124 23002
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
                                                  2827
                                                                         10µF 20% 16V
                                                                                                     3579
0340
       4822 267 10974
                       Connector 9P m v 2.50 Wh
                                                  2829
                                                          4822 124 23002
                                                                         10μF 20% 16V
                                                                                                     3580
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
0341
       4822 267 10974
                       Connector 9P m v 2.50 Wh
                                                  2830
                                                          4822 124 23002
                                                                         10μF 20% 16V
                                                                                                     3581
                                                                                                            4822 117 10833
                                                                                                                            10k 1% 0.1W
                       Connector 3P m v 2.50 Ye
                                                                         10μF 20% 16V
0355
       4822 267 11043
                                                  2832
                                                          4822 124 23002
                                                                                                     3582
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
                      Connector 7P m v 2.50 Wh
0371
       2422 025 14904
                                                          5322 122 31863
                                                                                                            4822 117 11373
                                                  2835
                                                                         330pF 5% 63V
                                                                                                     3583
                                                                                                                            100Ω 1% 0805
0372
       4822 267 10979
                      Connector 9P m v 2.50 Bk
                                                  2840
                                                          4822 126 14585
                                                                         100nF 10% 50V
                                                                                                     3584
                                                                                                            4822 116 83933
                                                                                                                            15k 1% 0.1W
                       Connector 7P m v 2.50 Bk
0373
       4822 267 10978
                                                  2841
                                                          5322 124 41945
                                                                         22μF 20% 35V SMD
                                                                                                     3585
                                                                                                            4822 117 10833
                                                                                                                            10k 1% 0.1W
       4822 267 10962
                       Connector 11P m v 2.50 Wh
                                                  2842
                                                          5322 124 41945 22µF 20% 35V SMD
                                                                                                     3586
                                                                                                            4822 051 20472
                                                                                                                            4k7 5% 0.1W
0399
       4822 267 10962
                       Connector 11P m v 2.50 Wh
                                                          5322 124 41945 22μF 20% 35V SMD
                                                                                                            4822 117 10833
                                                  2843
                                                                                                     3587
                                                                                                                            10k 1% 0.1W
                      Fuse T0.2A 250V TR5
1513▲
       4822 071 52001
                                                          5322 124 41945
                                                                         22µF 20% 35V SMD
                                                                                                     3588
                                                                                                            4822 051 20273
                                                                                                                            27k 5% 0.1W
                                                  2844
       2422 025 16571
                       Connector 12P m v 2.54
1519
                                                                                                            4822 117 11449
                                                          5322 122 31863
                                                                         330pF 5% 63V
                                                  2846
                                                                                                     3589
                                                                                                                            2k2 5% 0.1W 0805
                       Cable 11P/220/11P Wh
8008
       3104 311 02681
                                                  2849
                                                          5322 122 32531
                                                                         100pF 5% 50V
                                                                                                     3590
                                                                                                            4822 117 10833
                                                                                                                            10k 1% 0.1W
8009
       3104 311 03451
                       Cable 9P/220/9P Bk
                                                  2850
                                                          5322 124 41945 22µF 20% 35V SMD
                                                                                                     3591
                                                                                                            4822 051 20108
                                                                                                                            1Ω 5% 0.1W
8015
       3104 311 03441
                       Cable 9P/60/9P Bk
                                                                         100nF 10% 50V
                                                  2880
                                                          4822 126 14585
                                                                                                     3592
                                                                                                            4822 051 20472 4k7 5% 0.1W
                       Cable 11P/280/11P Wh
8033
       3104 311 02691
                                                                                                            4822 051 10102
                                                                                                                            1k 2% 0.25W
                                                  2883
                                                          4822 124 23002 10uF 20% 16V
                                                                                                     3593
       3104 311 02601 Cable 7P/60/7P Wh
8071
                                                                                                     3594
                                                                                                            4822 051 20333
                                                                                                                            33k 5% 0.1W
                                                                                                     3595
                                                                                                            4822 051 20472 4k7 5% 0.1W
                                                   -/////-
                                                                                                     3596
                                                                                                            4822 051 20472 4k7 5% 0.1W
\dashv
                                                                                                            4822 117 11449 2k2 5% 0.1W 0805
                                                                                                     3597
                                                  3437
                                                          4822 051 20108 1Ω 5% 0.1W
                                                                                                            4822 051 20332
                                                                                                                            3k3 5% 0.1W
                                                                                                     3598
2450
       4822 126 14585 100nF 10% 50V
                                                  3440
                                                          4822\ 117\ 11927\ 75\Omega\ 1\%\ 0.1W
                                                                                                            4822 051 10102
                                                                                                     3599
                                                                                                                            1k 2% 0.25W
2460
       4822 126 14585 100nF 10% 50V
                                                  3441
                                                          4822 117 11927
                                                                         75Ω 1% 0.1W
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
                                                                                                     3602
2510
       4822 124 12095
                       100μF 20% 16V
                                                  3442
                                                          4822\ 117\ 11927\ 75\Omega\ 1\%\ 0.1W
                                                                                                     3603
                                                                                                            4822 051 20223 22k 5% 0.1W
                       100µF 20% 16V
2511
       4822 124 12095
                                                          4822 117 11449
                                                  3444
                                                                         2k2 5% 0.1W 0805
                                                                                                                            560Q 5% 0.1W
                                                                                                            4822 051 20561
2513
       4822 124 12095
                       100µF 20% 16V
                                                                                                     3605
                                                          4822 117 11449 2k2 5% 0.1W 0805
                                                  3445
                                                                                                     3606
                                                                                                            4822 051 20122
                                                                                                                            1.2kΩ 5% 0.1W
2514
       4822 124 12095
                       100µF 20% 16V
                                                  3446
                                                          4822\ 117\ 11373\ \ 100\Omega\ 1\%\ 0805
                                                                                                     3608
                                                                                                            4822 051 20122
                                                                                                                            1.2k\Omega 5% 0.1W
2515
       4822 126 14585
                       100nF 10% 50V
                                                  3447
                                                         4822 117 11373
4822 117 10833
                                                                         100Ω 1% 0805
                                                                                                            4822 117 11454
                                                                                                                            820Ω 1% 0,1W
                                                                                                     3609
2519
       5322 124 41945
                       22μF 20% 35V SMD
                                                  3452
                                                                         10k 1% 0.1W
       4822 126 13482 470nF 80/20% 16V
4822 126 14491 2.2μF -20+80% 10V 0805
                                                                                                     3610
                                                                                                            4822 117 11454
                                                                                                                            820Ω 1% 0,1W
2520
                                                          4822 117 10833
                                                  3453
                                                                         10k 1% 0.1W
                                                                                                            4822 117 10833
                                                                                                     3615
                                                                                                                            10k 1% 0.1W
2521
                                                  3456
                                                          4822 117 10833
                                                                         10k 1% 0.1W
                                                                                                            4822 117 11373
                                                                                                     3622
                                                                                                                            100Ω 1% 0805
       5322 122 32966
                       39pF 5% 50V
2522
                                                  3462
                                                          4822 117 10833
                                                                         10k 1% 0.1W
                                                                                                     3623
                                                                                                            4822 051 20223
                                                                                                                            22k 5% 0.1W
       4822 126 14491
                       2.2µF -20+80% 10V 0805
2523
                                                  3510▲
                                                         4822 052 10108
                                                                         1Ω 5% 0.33W
                                                                                                            4822 051 20561
                                                                                                                            560Ω 5% 0.1W
                                                                                                     3625
2524
       4822 126 13693
                       56pF 1% 63V
                                                         4822 052 10478 4Ω7 5% 0.33W
                                                  3511▲
                                                                                                     3626
                                                                                                            4822 051 20332
                                                                                                                            3k3 5% 0.1W
       4822 126 14491 2.2μF -20+80% 10V 0805
2525
                                                  3512 4822 052 10108
                                                                         1Ω 5% 0.33W
                                                                                                            5322 117 12487
4822 117 11596
                                                                                                     3627
                                                                                                                            1k 1% 0.125W
2526
       5322 122 32658 22pF 5% 50V
                                                   3519
                                                          4822 117 10833
                                                                         10k 1% 0.1W
                                                                                                     3628
                                                                                                                            390Q 1% 0.1W
2527
       4822 126 14491
                       2.2μF -20+80% 10V 0805
                                                  3520
                                                          4822 051 20822 8k2 5% 0,1W
                                                                                                     3629
                                                                                                            5322 117 12487
                                                                                                                            1k 1% 0.125W
2528
       5322 122 32966
                       39pF 5% 50V
                                                  3521
                                                          4822 051 20471 470Ω 5% 0.1W
                                                                                                            5322 117 12487
                                                                                                                            1k 1% 0.125W
                                                                                                     3630
2529
       4822 126 14491
                       2.2μF -20+80% 10V 0805
                                                  3522
                                                         4822 051 20471 470Ω 5% 0.1W
4822 117 11373 100Ω 1% 0805
                                                                                                     3631
                                                                                                            4822 051 20471
                                                                                                                            470\Omega 5% 0.1W
2530
       4822 126 13693 56pF 1% 63V
                                                  3523
                                                                                                     3642
                                                                                                            4822 117 11373
                                                                                                                            100\Omega 1% 0805
2531
       4822 126 14491 2.2uF -20+80% 10V 0805
                                                   3525
                                                          4822 051 20471 470Ω 5% 0.1W
                                                                                                     3643
                                                                                                            4822 051 20223
                                                                                                                            22k 5% 0.1W
2532
       5322 122 32658
                       22pF 5% 50V
                                                   3526
                                                          4822 051 20471
                                                                         470Ω 5% 0.1W
                                                                                                     3645
                                                                                                            4822 051 20561
                                                                                                                            560Ω 5% 0.1W
       5322 122 32966
                       39pF 5% 50V
2534
                                                   3527
                                                          4822 117 11373
                                                                         100Ω 1% 0805
                                                                                                     3648
                                                                                                            4822 117 11449
                                                                                                                            2k2 5% 0.1W 0805
2536
       4822 126 13693
                       56pF 1% 63V
                                                  3529
                                                          4822\ 051\ 20471\ \ 470\Omega\ 5\%\ 0.1W
                                                                                                     3649
                                                                                                            4822 051 20122
                                                                                                                            1.2k\Omega 5% 0.1W
       5322 122 32658 22pF 5% 50V
2538
                                                          4822 051 20471 470Ω 5% 0.1W
                                                  3530
                                                                                                     3650
                                                                                                            4822 117 11449
                                                                                                                            2k2 5% 0.1W 0805
                       100nF 10% 50V
2542
       4822 126 14585
                                                          4822 117 11373
                                                                         100Ω 1% 0805
                                                   3531
                                                                                                     3651
                                                                                                            4822 051 20122
                                                                                                                            1.2kΩ 5% 0.1W
2545
       4822 126 14585
                       100nF 10% 50V
                                                          4822 051 10102
                                                   3533
                                                                         1k 2% 0.25W
                                                                                                     3666
                                                                                                            4822 051 20471
                                                                                                                            470Ω 5% 0.1W
2546
       4822 126 14491
                       2.2µF -20+80% 10V 0805
                                                   3534
                                                          4822 051 10102
                                                                         1k 2% 0.25W
                                                                                                                            1Ω 5% 0.1W
                                                                                                            4822 051 20108
                                                                                                     3691
2550
       4822 126 14585
                       100nF 10% 50V
                                                   3535
                                                          4822 051 10102
                                                                         1k 2% 0.25W
                                                                                                     3706
                                                                                                            4822 051 20399
                                                                                                                            39\Omega 5% 0.1W
2551
       4822 124 12095
                       100μF 20% 16V
                                                  3536
                                                          4822 117 10361 680Ω 1% 0.1W
                                                                                                     3707
                                                                                                            4822 117 11503
                                                                                                                            220Ω 1% 0.1W
                       100nF 10% 50V
2570
       4822 126 14585
                                                   3537
                                                          4822 117 10361
                                                                         680Ω 1% 0.1W
                                                                                                     3708
                                                                                                            4822 117 11503 220Ω 1% 0.1W
                       100nF 10% 50V
2571
       4822 126 14585
                                                   3538
                                                          4822 117 10361
                                                                         680Ω 1% 0.1W
                                                                                                     3710
                                                                                                            4822 051 20399 39Ω 5% 0.1W
2575
                       100nF 10% 50V
       4822 126 14585
                                                   3539
                                                          4822 051 20332
                                                                         3k3 5% 0.1W
                                                                                                     3711
                                                                                                            4822 051 20399
                                                                                                                            39\Omega 5% 0.1W
       4822 126 14585
                       100nF 10% 50V
2585
                                                   3540
                                                          4822 051 20472
                                                                         4k7 5% 0.1W
                                                                                                     3712
                                                                                                            4822 117 10837
                                                                                                                            100k 1% 0.1W
2587
       5322 122 32268 470pF 5% 63V
                                                   3541
                                                          4822 117 10833
                                                                         10k 1% 0.1W
                                                                                                            4822\ 051\ 20399\ \ 39\Omega\ 5\%\ 0.1W
                                                                                                     3713
2588
       4822 122 33216 270pF 5% 50V
                                                          4822 117 10837
                                                                         100k 1% 0.1W
                                                   3542
                                                                                                     3714
                                                                                                            4822 117 10837
                                                                                                                            100k 1% 0.1W
2601
                       22μF 20% 35V SMD
       5322 124 41945
                                                          4822 117 10833
                                                   3543
                                                                         10k 1% 0.1W
                                                                                                     3716
                                                                                                            4822 117 10837
                                                                                                                            100k 1% 0.1W
2607
       4822 126 14585
                       100nF 10% 50V
                                                   3544
                                                          3198 021 52240
                                                                         220k 5% 0805
                                                                                                     3718
                                                                                                            4822 117 10837
                                                                                                                            100k 1% 0.1W
2610
       4822 126 14585
                       100nF 10% 50V
                                                   3545
                                                          4822 051 20474 470k 5% 0.1W
                                                                                                     3720
                                                                                                            4822 117 11448
                                                                                                                            180Ω 1% 0.1W
2622
       5322 124 41945
                       22μF 20% 35V SMD
                                                   3546
                                                          4822 051 10102
                                                                         1k 2% 0.25W
                                                                                                            4822 117 11373
                                                                                                     3722
                                                                                                                            100\Omega 1% 0805
2642
       5322 124 41945
                       22µF 20% 35V SMD
                                                   3547
                                                          4822 117 10833
                                                                         10k 1% 0.1W
10k 1% 0.1W
                       100μF 20% 16V
                                                                                                     3723
                                                                                                            4822 117 11373
                                                                                                                            100Ω 1% 0805
2655
       4822 124 12095
                                                   3548
                                                          4822 117 10833
                       100nF 10% 50V
                                                                                                     3724
                                                                                                            4822 117 11448
                                                                                                                            180Ω 1% 0.1W
2656
       4822 126 14585
                                                   3550
                                                          4822 051 10102
                                                                         1k 2% 0.25W
                                                                                                     3725
                                                                                                            4822 117 11448
                                                                                                                            180Ω 1% 0.1W
2665
       4822 124 12095
                       100μF 20% 16V
                                                          4822 051 10102
                                                                         1k 2% 0.25W
                                                   3551
                                                                                                     3726
                                                                                                            4822 117 10834 47k 1% 0.1W
2666
       4822 126 14585
                       100nF 10% 50V
                                                   3552
                                                          4822 051 10102
                                                                         1k 2% 0.25W
                                                                                                            4822 117 12955 2k7 1% 0.1W 0805
                                                                                                     3727
2707
       4822 126 14076
                       220nF 25V. 20%
                                                   3553
                                                          4822 051 20471
                                                                         470Ω 5% 0.1W
                                                                                                     3728
                                                                                                            4822 117 10834 47k 1% 0.1W
2708
                       220nF 25V, 20%
       4822 126 14076
                                                          4822 051 20471 470Ω 5% 0.1W
                                                   3554
                                                                                                            4822 117 12955 2k7 1% 0.1W 0805
4822 117 11503 220Ω 1% 0.1W
                                                                                                     3729
2710
       4822 126 14585
                       100nF 10% 50V
                                                          4822 051 20471
                                                   3555
                                                                         470Ω 5% 0.1W
                                                                                                     3730
       4822 126 14076 220nF 25V. 20%
                                                          4822 051 10102 1k 2% 0.25W
                                                                                                     3732
                                                                                                            4822 117 11503 220Ω 1% 0.1W
2713
       4822 126 14076 220nF 25V. 20%
                                                   3557
                                                          4822 051 10102 1k 2% 0.25W
                                                                                                            4822 117 11503 220Ω 1% 0.1W
       4822 126 14076 220nF 25V. 20%
```

3558

4822 051 10102 1k 2% 0.25W

EN 108	10.	F21RE AB	Spare Parts List
			oparo : arto = ot

3743							
	4822 051 20223 22k 5% 0.1W	5840 4822 15	57 11074	Bead 600Ω at 100MHz	7870	9340 547 13215	BSH103
3744	4822 117 10833 10k 1% 0.1W	1		Bead 600Ω at 100MHz	7880	5322 209 33172	
3745	4822 117 10833 10k 1% 0.1W				7881	5322 130 60159	
3746	4822 117 10833 10k 1% 0.1W				7884	4822 130 61553	
3747	4822 117 11507 6k8 1% 0.1W	-> -					3.3.2.23
3748	4822 117 10834 47k 1% 0.1W	1					
3749	4822 051 20474 470k 5% 0.1W		49 10685	BZM55-C33	Fron	t Panel [FP1	1
3750	4822 051 20472 4k7 5% 0.1W			BZM55-C33		t i dilei [i i i	.1
3752	4822 051 20472 4k7 5% 0.1W		49 10685	BZM55-C33			
3754	4822 051 20229 22Ω 5% 0.1W			BZM55-C33	Variou	IS	
3755	4822 051 20229 22Ω 5% 0.1W			BZM55-C33			
3756	4822 051 20229 22Ω 5% 0.1W			1PS76SB10	0011	3122 124 36091	
3757	4822 051 20229 22Ω 5% 0.1W			1PS76SB10	0012	3122 358 76351	
3760	4822 117 11449 2k2 5% 0.1W 0805		49 10685	BZM55-C33	0301		Socket phono 1P f v 3.5mm
3761	4822 051 10102 1k 2% 0.25W			BZM55-C33	0302		Socket cinch Re
3762	4822 117 11449 2k2 5% 0.1W 0805	4		BZM55-C33	0303		Socket cinch Wh
3763	4822 051 10102 1k 2% 0.25W	6570 4822 13	30 11528	1PS76SB10	0304		Socket cinch Ye
3764	4822 117 11449 2k2 5% 0.1W 0805			1PS76SB10	0305		Socket SVHS 4P f v
3765	4822 051 10102 1k 2% 0.25W		49 10685	BZM55-C33	0308		Connector 11P m h 2.50
3766	4822 117 11449 2k2 5% 0.1W 0805			BZM55-C33	0309		Connector 9P m h 2.50
3767	4822 051 10102 1k 2% 0.25W			BZM55-C33	0344		Connector 3p m
3768	4822 051 20822 8k2 5% 0,1W			BZM55-C33	1006	2422 128 02951	
3769	4822 051 20822 8k2 5% 0,1W			BZM55-C33	1008	4822 276 13732	
3773	4822 051 20108 1Ω 5% 0.1W			BZM55-C33	1010	4822 276 13732	
3800	4822 051 10102 1k 2% 0.25W			BZM55-C33	1012	4822 276 13732	
3801	4822 051 20332 3k3 5% 0.1W			1PS76SB10	1014	4822 276 13732	
3802	4822 117 10833 10k 1% 0.1W		30 11397		1016	4822 276 13732	Tact switch
3803	4822 051 20333 33k 5% 0.1W	1		BZM55-C4V7			
3805	4822 051 10102 1k 2% 0.25W			1PS76SB10	 →⊢		
3806	4822 051 20332 3k3 5% 0.1W		30 11397		Ι "		
3807	4822 117 10833 10k 1% 0.1W		30 11397		2005	5322 122 34098	10nF 10% 63V
3808	4822 051 20333 33k 5% 0.1W			BZM55-C33	2020		100μF 20% 16V
3822	4822 117 11373 100Ω 1% 0805			BZM55-C33	2025		100μF 20% 16V
3824	4822 117 11373 100Ω 1% 0805			BZM55-C33	2026		100μF 20% 16V
3835	4822 117 10833 10k 1% 0.1W			BZM55-C33	2040		220nF 25V. 20%
3836	4822 051 20154 150k 5% 0.1W		30 11397		2048	4822 126 12105	
3837	4822 051 20333 33k 5% 0.1W			BZM55-C33	2053	4822 124 40763	
3841	3198 021 52240 220k 5% 0805			BZM55-C33	2055		100nF 10% 50V
3842	3198 021 52240 220k 5% 0805			BZM55-C33	2056		100nF 10% 50V
3843	4822 117 13577 330Ω 1% 0805 1.25W			BZM55-C33	2057		100nF 10% 50V
3844	4822 117 13577 330Ω 1% 0805 1.25W			BZM55-C33	2057	5322 122 34098	
3845	4822 117 10353 150Ω 1% 0.1W			BZM55-C33	2060	5322 122 31863	
3846	3198 021 52240 220k 5% 0805		30 11397		2061	5322 122 32531	
3847	4822 117 10353 150Ω 1% 0.1W		30 11397		2065	5322 122 31863	
3848	3198 021 52240 220k 5% 0805		30 11397		2066	5322 122 32531	
3849	4822 051 10102 1k 2% 0.25W		30 11397		2072	5322 122 34098	
3850	4822 051 10102 1k 2% 0.25W		30 11397		2075	5322 122 34098	
3851	4822 051 20333 33k 5% 0.1W		30 11397				
3852	4822 117 10834 47k 1% 0.1W	6876 9322 1	49 10685	BZM55-C33			
3854	4822 117 10834 47k 1% 0.1W				-WV-		
3861	4822 117 10833 10k 1% 0.1W	-C C					
3862	4822 117 10834 47k 1% 0.1W	- \ 0000000			3001	4822 051 20332	
3865	4822 117 10834 47k 1% 0.1W		00 11500	DOTALIOTATOOT			
		7450 5322 2	09 11596	PC/4HC145381	3002		10Ω 5% 2W
3867	4822 117 10837 100k 1% 0.1W		30 60159	PC74HCT4538T BC846B	3003	2322 194 63109	10Ω 5% 2W
3867 3868	4822 117 10837 100k 1% 0.1W 4822 117 10837 100k 1% 0.1W	7453 5322 1	30 60159		3003 3008	2322 194 63109 4822 051 10102	10Ω 5% 2W 1k 2% 0.25W
3867	4822 117 10837 100k 1% 0.1W	7453 5322 13 7460 4822 20	30 60159 09 30212	BC846B PC74HCT125T	3003 3008 3009	2322 194 63109 4822 051 10102 4822 051 10102	10Ω 5% 2W 1k 2% 0.25W 1k 2% 0.25W
3867 3868 3869 3870	4822 117 10837 100k 1% 0.1W 4822 117 10837 100k 1% 0.1W 4822 117 10837 100k 1% 0.1W 4822 117 10837 100k 1% 0.1W	7453 5322 13 7460 4822 20 7520 4822 20	30 60159 09 30212 09 12776	BC846B PC74HCT125T TDA8601T/C1	3003 3008 3009 3010	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102	10Ω 5% 2W 1k 2% 0.25W 1k 2% 0.25W 1k 2% 0.25W
3867 3868 3869 3870 3875	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W	7453 5322 13 7460 4822 20 7520 4822 20 7540 4822 20	30 60159 09 30212 09 12776 09 73852	BC846B PC74HCT125T	3003 3008 3009 3010 3011	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373	$\begin{array}{l} 10\Omega\ 5\%\ 2W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 100\Omega\ 1\%\ 0805 \end{array}$
3867 3868 3869 3870 3875 3876	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805	7453 5322 13 7460 4822 20 7520 4822 20 7540 4822 20 7545 4822 20	30 60159 09 30212 09 12776 09 73852 09 71585	BC846B PC74HCT125T TDA8601T/C1 PMBT2369	3003 3008 3009 3010 3011 3012	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471	10Ω 5% 2W 1k 2% 0.25W 1k 2% 0.25W 1k 2% 0.25W 100Ω 1% 0.85W 100Ω 1% 0805
3867 3868 3869 3870 3875 3876 3880	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 117 10833 10k 1% 0.1W	7453 5322 13 7460 4822 20 7520 4822 20 7540 4822 20 7545 4822 20 7546 4822 20	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N	3003 3008 3009 3010 3011 3012 3013	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353	$\begin{array}{l} 10\Omega\ 5\%\ 2W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 100\Omega\ 1\%\ 0805 \\ 470\Omega\ 5\%\ 0.1W \\ 150\Omega\ 1\%\ 0.1W \\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 117 10833 10k 1% 0.1W 4822 117 11373 100Ω 1% 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7540 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B	3003 3008 3009 3010 3011 3012 3013 3014	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373	$\begin{array}{l} 10\Omega\ 5\%\ 2W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 100\Omega\ 1\%\ 0805 \\ 470\Omega\ 5\%\ 0.1W \\ 150\Omega\ 1\%\ 0.1W \\ 100\Omega\ 1\%\ 0805 \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882	$4822\ 117\ 10837\ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ \ 10837\ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ \ 10837\ \ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ \ 10834\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	7453 5322 1: 7460 4822 2: 7520 4822 2: 7540 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID	3003 3008 3009 3010 3011 3012 3013 3014 3015	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11373	$\begin{array}{l} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 100\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883	$4822\ 117\ 10837\ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ \ 10837\ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ \ 10837\ \ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ \ 10834\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1: 7570 5322 2: 7571 5322 1:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 11598 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\Omega\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894	$4822\ 117\ 10837$ $100k\ 1\%\ 0.1W$ $4822\ 117\ 10833$ $10k\ 1\%\ 0.1W$ $4822\ 117\ 10833$ $10k\ 1\%\ 0.1W$ $4822\ 117\ 10833$ $10k\ 1\%\ 0.1W$ $4822\ 117\ 11373$ $100\Omega\ 1\%\ 0805$ $4822\ 117\ 11349$ $2k2\ 5\%\ 0.1W$ $4822\ 117\ 11449$ $2k2\ 5\%\ 0.1W\ 0805$	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 11598 30 60159 09 73852	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 100\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894 3895	$4822\ 117\ 10837\ \ 100k\ 1\%\ 0.1W$ $4822\ 117\ 10833\ \ 10k\ 1\%\ 0.1W$ $4822\ 117\ 11373\ \ 100Ω\ 1\%\ 0805$ $4822\ 117\ 11449\ \ 2k2\ 5\%\ 0.1W\ 0805$ $4822\ 117\ 11449\ \ 2k2\ 5\%\ 0.1W\ 0805$	7453 5322 1: 7460 4822 2: 7520 4822 2: 7540 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1: 7570 5322 2: 7573 4822 2: 7573 4822 2: 7575 5322 2:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 6668 30 60159 09 11598 30 60159 09 73852 09 71568	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 051 20121	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 100\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0805\\ 470\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0,1W\\ 120\Omega\;5\%\;0,1W\\ 12\;5\%\;0.33W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894 3895 4408	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 4822 117 11449 2k2 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7573 4822 2: 7575 5322 2: 7587 5322 1:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 11598 30 60159 09 73852 09 71568 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020 3025	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 051 20121 4822 052 10108 4822 117 13577	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\Omega\;1\%\;0.25W\\ 100\Omega\;1\%\;0.805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 150\Omega\;1\%\;0.805\\ 100\Omega\;1\%\;0.805\\ 100\Omega\;1\%\;0.805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\;5\%\;0.31W\\ 330\Omega\;1\%\;0.805\\ 1.25W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894 3895 4408 4410	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 10833 10k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 117 11373 100Ω 1% 0805 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 4822 117 11449 2k2 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7589 4822 2:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 73852 09 71568 30 60159 09 73852	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020 3025 3026	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13577	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\Omega\;1\%\;0.805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 130\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 1200\;5\%\;0.3W\\ 330\Omega\;1\%\;0805\;1.25W\\ 330\Omega\;1\%\;0805\;1.25W\\ 330\Omega\;1\%\;0805\;1.25W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894 4408 4410 4412	$4822\ 117\ 10837\ 100k\ 1\%\ 0.1W$ $4822\ 117\ 10837\ 100k\ 1\%\ 0.1W$ $4822\ 117\ 10837\ 100k\ 1\%\ 0.1W$ $4822\ 117\ 10834\ 47k\ 1\%\ 0.1W$ $4822\ 117\ 10834\ 47k\ 1\%\ 0.1W$ $4822\ 117\ 10833\ 10k\ 1\%\ 0.1W$ $4822\ 117\ 10833\ 10k\ 1\%\ 0.1W$ $4822\ 117\ 10833\ 10k\ 1\%\ 0.1W$ $4822\ 117\ 11373\ 100\Omega\ 1\%\ 0805$ $4822\ 117\ 11373\ 100\Omega\ 1\%\ 0805$ $4822\ 051\ 20474\ 470k\ 5\%\ 0.1W$ $4822\ 117\ 11449\ 2k2\ 5\%\ 0.1W\ 0805$ $4822\ 051\ 20008\ Jumper\ 0805$ $4822\ 051\ 20008\ Jumper\ 0805$ $4822\ 051\ 20008\ Jumper\ 0805$	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7556 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7589 4822 2: 7603 5322 1:	30 60159 09 30212 09 73852 09 73852 09 73852 45 66668 30 60159 09 73852 09 71568 30 60159 09 73852 09 73852 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020 3025 3026 3027	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13577 4822 117 13577	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.33W\\ 330\Omega\;1\%\;0805\;1.25W\\ 330\Omega\;1\%\;0805\;1.25W\\ 6k8\;1\%\;0.1W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894 4408 4410 4412 4450	$4822\ 117\ 10837$ $100k\ 1\%\ 0.1W$ $4822\ 117\ 10833$ $100k\ 1\%\ 0.1W$ $4822\ 117\ 11373$ $100\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\Omega\ 1\%\ 0805$ $4822\ 117\ 11449$ $2k2\ 5\%\ 0.1W$ 4805 470 $470k\ 5\%\ 0.1W$ 4805 $4820\ 117\ 11449$ $2k2\ 5\%\ 0.1W\ 0805$ $4822\ 051\ 20008$ 300	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7568 5322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7587 5322 1: 7589 4822 2: 7603 5322 1: 7607 9322 1:	30 60159 09 30212 09 30212 09 73852 09 73852 09 73852 45 66668 30 60159 09 73852 09 71568 30 60159 09 73852 30 60159 99 73852 30 60159 99 73852	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B TSH93ID	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3025 3025 3026 3027 3029	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577	$\begin{array}{c} 10\Omega\ 5\%\ 2W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 100\Omega\ 1\%\ 0805 \\ 470\Omega\ 5\%\ 0.1W \\ 150\Omega\ 1\%\ 0.1W \\ 100\Omega\ 1\%\ 0805 \\ 100\Omega\ 1\%\ 0805 \\ 270\Omega\ 1\%\ 0.1W \\ 120\Omega\ 5\%\ 0.1W \\ 120\Omega\ 5\%\ 0.1W \\ 120\Omega\ 5\%\ 0.33W \\ 330\Omega\ 1\%\ 0805\ 1.25W \\ 330\Omega\ 1\%\ 0805\ 1.25W \\ 6k8\ 1\%\ 0.1W \\ 470\Omega\ 5\%\ 0.1W \\ \end{array}$
3867 3868 3869 3870 3875 3876 3881 3882 3883 3894 4408 4410 4412 4450 4450	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7556 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7573 4822 2: 7575 5322 2: 7587 5322 1: 7589 4822 2: 7603 5322 1: 7600 9322 1: 7610 4822 2:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 71852 09 73852 09 73852 09 73852 30 60159 09 73852 30 60159 45 66668 46 60159 46 60668	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B PMBT2369 BC846B TSH93ID 74HC4053D	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020 3025 3026 3027	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 20471 4822 117 11373 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13577 4822 117 1507 4822 051 20471 4822 051 20471	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\;2\;5W\\ 100\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 150\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 130\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\;5\%\;0.33W\\ 330\Omega\;1\%\;0805\;1.25W\\ 330\Omega\;1\%\;0805\;1.25W\\ 6k8\;1\%\;0.1W\\ 470\Omega\;5\%\;0.1W\\ 560\Omega\;5\%\;0.1W\\ \\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3882 3883 3894 4408 4410 4412 4450	$4822\ 117\ 10837$ $100k\ 1\%\ 0.1W$ $4822\ 117\ 10833$ $100k\ 1\%\ 0.1W$ $4822\ 117\ 11373$ $100\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\Omega\ 1\%\ 0805$ $4822\ 117\ 11373$ $10\Omega\Omega\ 1\%\ 0805$ $4822\ 117\ 11449$ $2k2\ 5\%\ 0.1W$ 4805 470 $470k\ 5\%\ 0.1W$ 4805 $4820\ 117\ 11449$ $2k2\ 5\%\ 0.1W\ 0805$ $4822\ 051\ 20008$ 300	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7556 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7576 5322 2: 7577 4822 2: 7577 4822 2: 7589 4822 2: 7603 5322 1: 7607 9322 1: 7610 4822 2: 7615 4822 1:	30 60159 09 30212 09 12776 09 73852 09 73852 45 66668 30 60159 09 73852 09 73852 09 73852 09 73852 30 60159 09 73852 30 60159 45 66668 09 60792 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B PMBT2369 BC846B TSH93ID 74HC4053D DTC124EU	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020 3025 3026 3027 3029 3030	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 20471 4822 117 11373 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13577 4822 117 11507 4822 051 20471 4822 051 20471 4822 051 2051	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\;25W\\ 10\;25W\\ 100\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.33W\\ 330\Omega\;1\%\;0805\;1.25W\\ 330\Omega\;1\%\;0805\;1.25W\\ 6k8\;1\%\;0.1W\\ 470\Omega\;5\%\;0.1W\\ 560\Omega\;5\%\;0.1W\\ 560\Omega\;5\%\;0.1W\\ 100\Omega\;1\%\;0805\\ \end{array}$
3867 3868 3869 3870 3875 3876 3881 3882 3883 3894 4408 4410 4412 4450 4450	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7556 9322 1: 7568 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7575 5322 2: 7576 5322 2: 7576 5322 2: 7567 9322 1: 7607 9322 1: 7610 4822 2: 7615 4822 1:	30 60159 09 30212 09 30212 09 73852 09 73852 45 6668 30 60159 09 73852 30 60159 09 73852 30 60159 45 6668 30 60159 09 73852 30 60159 45 6668 30 6153 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B PMBT2369 BC846B TSH93ID 74HC4053D DTC124EU BC846B	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3020 3025 3026 3027 3029 3030 3030	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11373 4822 117 11504 4822 117 11504 4822 051 20121 4822 051 20121 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 1507 4822 117 1507 4822 117 1507 4822 117 1507	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\Omega\;1\%\;0805\\ 470\Omega\;5\%\;0.1W\\ 150\Omega\;1\%\;0.1W\\ 150\Omega\;1\%\;0805\\ 100\Omega\;1\%\;0805\\ 270\Omega\;1\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.1W\\ 120\Omega\;5\%\;0.3W\\ 330\Omega\;1\%\;0805\;1.25W\\ 330\Omega\;1\%\;0805\;1.25W\\ 6k8\;1\%\;0.1W\\ 470\Omega\;5\%\;0.1W\\ 560\Omega\;5\%\;0.1W\\ 100\Omega\;1\%\;0805\\ 4k7\;5\%\;0.1W\\ \end{array}$
3867 3868 3869 3870 3875 3876 3880 3881 3894 3895 4408 4410 4412 4450 4451 4742	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7546 4822 2: 7546 4822 2: 7556 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7589 4822 2: 7603 5322 1: 7607 9322 1: 7610 4822 2: 7615 4822 1: 7623 5322 1: 7623 5322 1:	30 60159 09 30212 09 73852 09 73852 45 66668 30 60159 09 73852 45 66668 30 60159 09 73852 30 60159 09 73852 30 60159 45 66668 09 60792 30 61553 30 60159 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B TSH93ID 74HC4053D DT124EU BC846B BC846B BC846B	3003 3008 3009 3010 3011 3011 3012 3013 3014 3015 3016 3017 3020 3025 3026 3027 3029 3030 3030 3030 3030 3040 3041	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 10353 4822 117 11373 4822 117 11504 4822 117 11504 4822 051 20121 4822 052 10108 4822 117 13577 4822 051 20471 4822 051 20471 4822 051 20472 4822 117 10833	$\begin{array}{c} 10\Omega\ 5\%\ 2W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 1k\ 2\%\ 0.25W \\ 10\Omega\ 1\%\ 0.805 \\ 470\Omega\ 5\%\ 0.1W \\ 150\Omega\ 1\%\ 0.1W \\ 100\Omega\ 1\%\ 0805 \\ 270\Omega\ 1\%\ 0.805 \\ 270\Omega\ 1\%\ 0.1W \\ 120\Omega\ 5\%\ 0.1W \\ 120\Omega\ 5\%\ 0.1W \\ 130\Omega\ 1\%\ 0805\ 1.25W \\ 330\Omega\ 1\%\ 0805\ 1.25W \\ 330\Omega\ 1\%\ 0805\ 1.25W \\ 6k8\ 1\%\ 0.1W \\ 470\Omega\ 5\%\ 0.1W \\ 560\Omega\ 5\%\ 0.1W \\ 100\Omega\ 1\%\ 0805 \\ 4k7\ 5\%\ 0.1W \\ 10k\ 1\%\ 0.1W \\ \end{array}$
3867 3868 3869 3870 3875 3876 3881 3882 3883 3894 4408 4410 4412 4450 4450	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7556 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7587 5322 1: 7589 4822 2: 7603 5322 1: 7603 5322 1: 7604 4822 2: 7615 4822 1: 7615 4822 1: 7623 5322 1: 7643 5322 1: 7643 5322 1: 7643 5322 1: 7643 5322 1: 77610 4822 2: 7615 4822 1: 7615 4822 1: 7623 5322 1: 7643 5322 1: 7763 5322 1:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 73852 09 73852 09 73852 09 73852 30 60159 45 66668 09 60792 30 6159 30 60159 30 60159 30 60159 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B TSH93ID 74HC4053D DTC124EU BC846B BC846B TEA6415CD	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3025 3026 3027 3029 3030 3039 3040	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 20471 4822 117 11373 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13573 4822 051 20471 4822 051 20472 4822 117 10833 4822 117 10833	$\begin{array}{c} 10\Omega \ 5\% \ 2W \\ 1k \ 2\% \ 0.25W \\ 1k \ 2\% \ 0.25W \\ 1k \ 2\% \ 0.25W \\ 10\Omega \ 1\% \ 0.25W \\ 100\Omega \ 1\% \ 0.805 \\ 470\Omega \ 5\% \ 0.1W \\ 150\Omega \ 1\% \ 0.1W \\ 150\Omega \ 1\% \ 0.805 \\ 100\Omega \ 1\% \ 0.805 \\ 270\Omega \ 1\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 120\Omega \ 5\% \ 0.3W \\ 330\Omega \ 1\% \ 0.805 \ 1.25W \\ 330\Omega \ 1\% \ 0.805 \ 1.25W \\ 6k8 \ 1\% \ 0.1W \\ 470\Omega \ 5\% \ 0.1W \\ 100\Omega \ 1\% \ 0.805 \\ 4k7 \ 5\% \ 0.1W \\ 10k \ 1\% \ 0.1W \\ 10k \ 10$
3867 3868 3869 3870 3875 3876 3880 3881 3894 3895 4408 4410 4412 4450 4451 4742	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 4822 117 11449 2k2 5% 0.1W 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805	7453 5322 1: 7460 4822 2: 7520 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7575 5322 2: 7575 5322 2: 7587 5322 1: 7589 4822 2: 7603 5322 1: 7607 9322 1: 7607 9322 1: 7610 4822 2: 7615 4822 1: 7623 5322 1: 7643 5322 1: 7740 5322 2:	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 71588 30 60159 09 71568 30 60159 09 73852 09 73852 00 60159 09 60792 30 60159 30 60159 30 60159 30 60159 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B TSH93ID T4HC4053D DTC124EU BC846B BC846B TEA6415CD PC74HCT4538T	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3025 3026 3027 3029 3030 3039 3040 3041 3042 3044	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 20471 4822 117 11373 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 051 20121 4822 051 2013 4822 117 11507 4822 117 11507 4822 051 20471 4822 051 20471 4822 051 20471 4822 117 11373 4822 117 11373 4822 117 10833 4822 117 10833 4822 117 10833 4822 051 2032	$\begin{array}{c} 10\Omega\;5\%\;2W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 1k\;2\%\;0.25W\\ 10\;2\;5W\\ 10\;0\Omega\;1\%\;0805\\ 470\;\Omega\;5\%\;0.1W\\ 150\;\Omega\;1\%\;0805\\ 100\;\Omega\;1\%\;0805\\ 100\;\Omega\;1\%\;0805\\ 270\;\Omega\;1\%\;0.1W\\ 120\;0\;5\%\;0.1W\\ 120\;0\;5\%\;0.1W\\ 120\;0\;5\%\;0.1W\\ 130\;0\;1\%\;0805\;1.25W\\ 330\;\Omega\;1\%\;0805\;1.25W\\ 688\;1\%\;0.1W\\ 470\;\Omega\;5\%\;0.1W\\ 470\;\Omega\;5\%\;0.1W\\ 560\;\Omega\;5\%\;0.1W\\ 100\;\Omega\;1\%\;0805\\ 4k7\;5\%\;0.1W\\ 10k\;1\%\;0.1W\\ 10k\;1\%\;0.1W\\ 10k\;1\%\;0.1W\\ 10k\;1\%\;0.1W\\ 3k3\;5\%\;0.1W\\ \end{array}$
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3867 3868 3869 3870 3875 3876 3881 3882 3883 3894 4408 4410 4450 4451 4742 5553 5520 5523 5525 5529 5531 5535 5550 5575 5550 5575 5585 5610 5655 5710 5740	4822 117 10837 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 051 20474 470k 5% 0.1W 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805 4822 157 11074 Bead 600Ω at 100MHz 4821 157 11074 Bead 600Ω at 100MHz	7453 5322 1: 7460 4822 2: 7520 4822 2: 7540 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7557 5322 2: 7575 5322 2: 7575 5322 2: 7603 5322 1: 7603 5322 1: 7603 5322 1: 7604 4822 2: 7615 4822 1: 7610 4822 2: 7615 4822 1: 7623 5322 1: 7740 5322 1: 7740 5322 1: 7740 5322 1: 7745 5322 1: 7746 5322 1: 7746 5322 1: 7746 5322 1: 7751 4822 1: 7761 5322 1: 7763 5322 1: 7763 5322 1: 7766 5322 1: 7767 5322 1: 7767 5322 1: 7768 5322 1: 7769 5322 1: 7769 5322 1: 7761 5322 1: 7763 5322 1: 7763 5322 1: 7764 5322 1: 7765 5322 1: 7767 5322 1: 7768 5322 1: 7768 5322 1: 7769 769 769 769 769 769 769 76	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 71585 30 60159 09 73852 09 73852 09 73852 30 60159 30 6059 30 6073 30 6059 30 6073 30 6059 30 6073	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B TSH93ID T4HC4053D DTC124EU BC846B	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3025 3026 3027 3029 3030 3039 3040 3041 3044 3045 3046 3046 3047 3050 3051 3053 3057 3053 3057 3058 3061 3062 3063 3063 3063 3066 3066 3067	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 051 20471 4822 117 11373 4822 117 11373 4822 117 11504 4822 051 20121 4822 052 10108 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 051 20471 4822 051 2051 4822 051 20471 4822 051 2051 4822 117 10833 4822 051 20108 4822 051 20108 4822 051 20108 4822 051 20108 4822 051 20108 4822 051 2018 4822 051 2018 4822 051 2018 4822 051 20332 4822 117 10837 4822 117 10837 4822 117 10833 4822 051 20332 4822 117 10833 4822 051 20332 4822 051 20332 4822 051 20333 4822 051 10102 4822 051 10102 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033 4822 051 10033	$\begin{array}{c} 10\Omega \ 5\% \ 2W \\ 1k \ 2\% \ 0.25W \\ 1k \ 2\% \ 0.25W \\ 1k \ 2\% \ 0.25W \\ 10\Omega \ 1\% \ 0.25W \\ 10\Omega \ 1\% \ 0.805 \\ 470\Omega \ 5\% \ 0.1W \\ 150\Omega \ 1\% \ 0.1W \\ 150\Omega \ 1\% \ 0.1W \\ 100\Omega \ 1\% \ 0805 \\ 270\Omega \ 1\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 330\Omega \ 1\% \ 0805 \ 1.25W \\ 688 \ 1\% \ 0.1W \\ 470\Omega \ 5\% \ 0.1W \\ 560\Omega \ 5\% \ 0.1W \\ 100\Omega \ 1\% \ 0805 \\ 4k7 \ 5\% \ 0.1W \\ 10k \ 1\% \ 0.1W \\ 120K \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 34k \ 3\% \ 0.1$
3867 3868 3869 3870 3875 3876 3881 3882 3883 3895 4408 4410 4450 4451 4742 5450 5513 5525 5529 5531 5525 5529 5537 5545 5555 5570 5575 5585 5610 5655 5710	4822 117 10837 100k 1% 0.1W 4822 117 10834 100k 1% 0.1W 4822 117 10834 47k 1% 0.1W 4822 117 11373 100Ω 1% 0805 4822 117 11449 2k2 5% 0.1W 0805 4822 051 20008 Jumper 0805 4822 051 2008 Jumper 0805 4822 051 20008 Jumper 0805 4822 157 11074 Bead 600Ω at 100MHz 4822 157 11074 Bead 600Ω at 00MHz 4822 157 11074 Bead 600Ω at 100MHz 4821 157 11074 Bead 600Ω at 100MHz	7453 5322 1: 7460 4822 2: 7520 4822 2: 7540 4822 2: 7545 4822 2: 7546 4822 2: 7550 9322 1: 7570 5322 2: 7571 5322 1: 7573 4822 2: 7557 5322 2: 7575 5322 2: 7575 5322 2: 7603 5322 1: 7603 5322 1: 7603 5322 1: 7604 4822 2: 7615 4822 1: 7610 4822 2: 7615 4822 1: 7623 5322 1: 7740 5322 1: 7740 5322 1: 7740 5322 1: 7745 5322 1: 7746 5322 1: 7746 5322 1: 7746 5322 1: 7751 4822 1: 7761 5322 1: 7763 5322 1: 7763 5322 1: 7766 5322 1: 7767 5322 1: 7767 5322 1: 7768 5322 1: 7769 5322 1: 7769 5322 1: 7761 5322 1: 7763 5322 1: 7763 5322 1: 7764 5322 1: 7765 5322 1: 7767 5322 1: 7768 5322 1: 7768 5322 1: 7769 769 769 769 769 769 769 76	30 60159 09 30212 09 12776 09 73852 09 71585 09 73852 45 66668 30 60159 09 71586 30 60159 09 73852 09 73852 09 73852 09 73852 09 73852 30 60159 30 60159	BC846B PC74HCT125T TDA8601T/C1 PMBT2369 74HCT4538N PMBT2369 TSH93ID BC846B PC74HCT4538T BC846B PMBT2369 PC74HCT14T BC846B PMBT2369 BC846B TSH93ID T4HC4053D DTC124EU BC846B	3003 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3025 3026 3027 3029 3030 3039 3040 3041 3044 3045 3048 3049 3050 3051 3053 3055 3057 3057 3053 3060 3061 3062 3065 3065 3066	2322 194 63109 4822 051 10102 4822 051 10102 4822 051 10102 4822 117 11373 4822 117 10353 4822 117 11373 4822 117 11504 4822 051 2011 4822 051 2011 4822 051 2011 4822 051 2011 4822 051 2017 4822 117 11507 4822 117 11507 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 13577 4822 117 1087 4822 051 20471 4822 051 2051 4822 117 10833 4822 117 10833 4822 051 20108 4822 051 20164 4822 051 20164 4822 051 20164 4822 051 20168 4822 051 20164 4822 051 20168 4822 051 2018 4822 051 20393 4822 117 10837 4822 117 10833 4822 117 10833 4822 117 10833 4822 117 10833 4822 051 20332 4822 117 10833 4822 051 20332 4822 051 20333 4822 051 20333 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 10102 4822 051 20333	$\begin{array}{c} 10\Omega \ 5\% \ 2W \\ 1k \ 2\% \ 0.25W \\ 1k \ 2\% \ 0.25W \\ 1k \ 2\% \ 0.25W \\ 10\Omega \ 1\% \ 0.25W \\ 10\Omega \ 1\% \ 0.805 \\ 470\Omega \ 5\% \ 0.1W \\ 150\Omega \ 1\% \ 0.1W \\ 150\Omega \ 1\% \ 0.1W \\ 100\Omega \ 1\% \ 0805 \\ 270\Omega \ 1\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 120\Omega \ 5\% \ 0.1W \\ 330\Omega \ 1\% \ 0805 \ 1.25W \\ 688 \ 1\% \ 0.1W \\ 470\Omega \ 5\% \ 0.1W \\ 560\Omega \ 5\% \ 0.1W \\ 100\Omega \ 1\% \ 0805 \\ 4k7 \ 5\% \ 0.1W \\ 10k \ 1\% \ 0.1W \\ 120K \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 120K \ 0.25W \\ 33k \ 5\% \ 0.1W \\ 34k \ 3\% \ 0.1$

```
3070
       4822 051 20121
                       120Ω 5% 0.1W
                                                   2003
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2254
                                                                                                             4822 126 14076 220nF 25V. 20%
       4822 051 20121
                       120Ω 5% 0,1W
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2255
                                                                                                             4822 126 14076 220nF 25V. 20%
3071
                                                   2005
                                                          2238 586 59812
3072
       4822 117 10833
                       10k 1% 0.1W
                                                   2006
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2256
                                                                                                             4822 126 14076
                                                                                                                             220nF 25V 20%
                                                                          100nF +80/-20% 50V 0603
                                                                                                                             220nF 25V, 20%
                                                                                                      2257
                                                                                                             4822 126 14076
3073
       4822 051 20121
                       120Ω 5% 0.1W
                                                   2008
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                             4822 126 14076
                                                                                                                             220nF 25V. 20%
                       120Ω 5% 0.1W
                                                                                                      2258
3074
       4822 051 20121
                                                   2009
                                                          2238 586 59812
       4822 117 10833
                                                   2010
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2259
                                                                                                             4822 126 14076
                                                                                                                             220nF 25V. 20%
3075
                       10k 1% 0.1W
       4822 117 10833
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2300
                                                                                                             4822 124 40196
                                                                                                                             220μF 20% 16V
3099
                       10k 1% 0.1W
                                                   2011
                                                          2238 586 59812
                                                                                                                             100nF 10% 50V
                       Jumper 0805
4005
       4822 051 20008
                                                   2012
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2301
                                                                                                             4822 126 14585
                                                                                                                             100nF 10% 50V
4006
       4822 051 20008
                       Jumper 0805
                                                   2013
                                                          4822 126 14076
                                                                          220nF 25V, 20%
                                                                                                      2302
                                                                                                             4822 126 14585
                                                          4822 126 11669
                                                                          27pF 5% 50V 0603
                                                                                                                             2.2µF 20% 50V
4060
       4822 051 20008
                       Jumper 0805
                                                   2014
                                                                                                     2303
                                                                                                             4822 124 22652
4061
       4822 051 20008
                       Jumper 0805
                                                   2015
                                                          4822 126 14585
                                                                          100nF 10% 50V
                                                                                                     2304
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                                                                                             10pF 10% 50V
10pF 10% 50V
4062
       4822 051 20008
                       Jumper 0805
                                                   2016
                                                          2238 861 18339
                                                                          33pF 1% 50V
                                                                                                      2307
                                                                                                             4822 122 33741
4063
       4822 051 20008
                                                   2021
                                                          4822 126 14585
                                                                          100nF 10% 50V
                                                                                                      2308
                                                                                                             4822 122 33741
                       Jumper 0805
                                                                                                                             220μF 20% 16V
100nF +80/-20% 50V 0603
4064
       4822 051 20008 Jumper 0805
                                                   2022
                                                          4822 126 14076
                                                                          220nF 25V. 20%
                                                                                                      2311
                                                                                                             4822 124 40196
                                                                          100nF +80/-20% 50V 0603
                                                                                                             2238 586 59812
                                                                                                      2312
                                                   2023
                                                          2238 586 59812
                                                                          1nF 10% 50V 0603
                                                                                                             4822 126 13881
                                                                                                                             470pF 5% 50V
                                                   2024
                                                          5322 126 11578
                                                                                                      2321
                                                                                                                             470pF 5% 50V
10nF 10% 50V 0603
                                                                          100nF+80/-20% 50V 0603
                                                   2025
                                                          2238 586 59812
                                                                                                      2322
                                                                                                             4822 126 13881
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2331
                                                                                                             5322 126 11583
                                                   2026
       9322 129 33685 BZM55-C3V3
6001
                                                                          100nF +80/-20% 50V 0603
100nF +80/-20% 50V 0603
                                                   2027
                                                          2238 586 59812
                                                                                                      2340
                                                                                                             4822 126 13881
                                                                                                                             470pF 5% 50V
       9322 127 27676
                       TSAL5300
6002
                                                                                                                             10pF 1% 50V
                                                   2028
                                                          2238 586 59812
                                                                                                      2343
                                                                                                             2238 861 18109
6012
       9322 155 82667
                       TSOP2236
                                                                          47μF 20% 25V
                                                          4822 124 40433
                                                                                                      2344
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2029
                       TSOP2236
6025
       9322 155 82667
                                                   2030
                                                          4822 124 40433
                                                                          47μF 20% 25V
                                                                                                      2351
                                                                                                             2020 552 96326
                                                                                                                             220nF 10% 16V
6030
       4822 209 72895 TLUV5320
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2403
                                                                                                             4822 126 14585
                                                                                                                             100nF 10% 50V
                                                   2031
                                                          2238 586 59812
6040
       9322 149 10685 BZM55-C33
                                                                                                                             100nF 10% 50V
                                                                          100nF +80/-20% 50V 0603
                                                   2032
                                                          2238 586 59812
                                                                                                      2404
                                                                                                             4822 126 14585
       9322 149 10685 BZM55-C33
6041
                                                                          100nF 10% 50V
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                                                   2035
                                                                                                      2405
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6046
       9322 149 10685 BZM55-C33
                                                                          100nF 10% 50V
                                                                                                      2406
                                                                                                             2238 586 59812
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                                                          4822 126 14585
                                                   2037
       9322 149 10685
                       BZM55-C33
6047
                                                                          100nF 10% 50V
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2038
                                                          4822 126 14585
                                                                                                      2407
                                                                                                             2238 586 59812
6060
       9322 149 10685 BZM55-C33
                                                          4822 126 13883
                                                   2039
                                                                          220pF 5% 50V
                                                                                                      2408
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       9322 149 10685 BZM55-C33
6061
                                                   2040
                                                          4822 122 33177
                                                                          10nF 20% 50V
                                                                                                     2414
                                                                                                             4822 051 30008
                                                                                                                             Jumper 0603
       9322 149 10685 BZM55-C33
6065
                                                   2042
                                                                          47pF 5% 50V 0603
                                                                                                     2415
                                                          4822 126 11785
                                                                                                             4822 051 30008
                                                                                                                             Jumper 0603
6066
       9322 149 10685
                       BZM55-C33
                                                   2043
                                                                          47pF 5% 50V 0603
                                                                                                      2416
                                                                                                             4822 051 30008
                                                                                                                             Jumper 0603
                                                          4822 126 11785
6070
       9322 149 10685
                       BZM55-C33
                                                                          47pF 5% 50V 0603
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2044
                                                          4822 126 11785
                                                                                                      2417
                                                                                                             2238 586 59812
6071
       9322 149 10685 BZM55-C33
                                                   2045
                                                          4822 124 41584
                                                                          100μF 20% 10V
                                                                                                      2418
                                                                                                             4822 124 40769
                                                                                                                             4.7µF 20% 100V
       9322 149 10685 BZM55-C33
6072
                                                                          100nF 10% 50V
                                                   2046
                                                          4822 126 14585
                                                                                                      2419
                                                                                                             5322 122 32654
                                                                                                                             63V 22nF 10%
       9322 149 10685 BZM55-C33
6073
                                                                          82pF 5% 50V 0603
82pF 5% 50V 0603
                                                                                                      2422
                                                                                                             4822 124 22652
                                                                                                                             2.2μF 20% 50V
                                                   2049
                                                          4822 126 14226
                                                                                                                             4.7μF 20% 100V
                                                   2050
                                                          4822 126 14226
                                                                                                      2423
                                                                                                             4822 124 40769
                                                                          82pF 5% 50V 0603
                                                                                                             4822 122 33761
                                                                                                                             22pF 5% 50V
C
                                                   2051
                                                          4822 126 14226
                                                                                                      2425
                                                   2052
                                                                          82pF 5% 50V 0603
                                                                                                      2427
                                                                                                             5322 126 10511
                                                                                                                             1nF 5% 50V
                                                          4822 126 14226
                                                                          82pF 5% 50V 0603
                                                                                                                             12pF 5% 50V 0603
                                                   2053
                                                          4822 126 14226
                                                                                                      2428
                                                                                                             4822 126 11663
7001
       4822 130 41246 BC327-25
                                                                          82pF 5% 50V 0603
                                                                                                                             12pF 5% 50V 0603
                                                   2054
                                                                                                      2429
                                                                                                             4822 126 11663
       4822 130 60511 BC847B
                                                          4822 126 14226
7044
                                                          4822 124 40196
                                                                                                      2430
                                                                                                             4822 122 33926
                                                                                                                             12pF 5% 50V 0805
                                                   2101
                                                                          220uF 20% 16V
7044
       5322 130 60159 BC846B
                                                                          220nF 80-20% 50V
                                                                                                                             47μF 20% 16V
                                                   2102
                                                          4822 126 13473
                                                                                                      2436
                                                                                                             4822 124 80151
7050
       4822 130 60511
                       BC847B
                                                                                                                             100nF +80/-20% 50V 0603
100nF +80/-20% 50V 0603
                                                   2104
                                                          4822 122 33177
                                                                          10nF 20% 50V
                                                                                                      2501
                                                                                                             2238 586 59812
       4822 130 60373
                       BC856B
7051
                                                   2105
2106
                                                                          10nF 20% 50V
7052
       4822 130 60373 BC856B
                                                          4822 122 33177
                                                                                                      2502
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
       9322 165 94668 TPS2014P
                                                          4822 122 33575
                                                                          220pF 5% 63V
                                                                                                      2503
                                                                                                             2238 586 59812
7055
                                                                          68pF 1% 63V
                                                                                                      2504
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2107
                                                          4822 126 13694
                                                   2108
                                                          5322 122 31873
                                                                          2.7pF 5% 100V
                                                                                                      2505
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2109
                                                           4822 124 22652
                                                                          2.2µF 20% 50V
                                                                                                      2506
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
Small Signal Panel [K]
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2110
                                                          4822 124 21913
                                                                          1μF 20% 63V
                                                                                                      2507
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2111
                                                          4822 126 14585
                                                                          100nF 10% 50V
                                                                                                      2508
                                                                                                             2238 586 59812
Various
                                                          4822 122 33891
                                                   2112
                                                                          3.3nF 10% 63V
                                                                                                      2509
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                                          470?F 20% 6.3V
                                                                                                                             100nF +80/-20% 50V 0603
                                                          4822 124 81044
                                                                                                      2510
                                                                                                             2238 586 59812
                                                   2116
       2422 486 80873 IC socket 42P DIL
                                                                                                                             100nF +80/-20% 50V 0603
100nF +80/-20% 50V 0603
                                                                          470nF 80/20% 16V
                                                                                                      2511
                                                                                                             2238 586 59812
                                                           4822 126 13482
8000
       2422 486 80928 IC socket 8P DIL
                                                   2118
                                                          5322 122 32967
                                                                          5.6pF 10% 63V
                                                                                                      2512
                                                                                                             2238 586 59812
0310
       4822 267 10964 Connector 9P m v 2.50 Rd
4822 267 10979 Connector 9P m v 2.50 Bk
                                                                          330pF 5% 63V
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2119
                                                          5322 122 31863
                                                                                                      2520
                                                                                                             2238 586 59812
0315
                                                                          220nF 25V. 20%
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2120
                                                          4822 126 14076
                                                                                                      2521
0328
       4822 267 10981
                       Connector 11P m v 2.50 Bk
                                                          4822 124 40248
                                                                                                                             3.3nF 10% 63V
                                                   2121
                                                                          10µF 20% 63V
                                                                                                      2522
                                                                                                             5322 126 11579
        4822 267 10962
                       Connector 11P m v 2.50 Wh
0333
                                                                                                                             18pF 5% 50V 0603
15pF 5% 50V
                                                   2125
                                                           4822 122 33177
                                                                          10nF 20% 50V
                                                                                                      2525
                                                                                                             4822 126 14507
0340
       4822 267 10974
                       Connector 9P m v 2.50 Wh
                                                   2126
                                                          4822 124 40433 47µF 20% 25V
                                                                                                      2528
                                                                                                             4822 122 33752
        4822 267 10974 Connector 9P m v 2.50 Wh
0341
                                                   2127
                                                          4822 126 14076 220nF 25V. 20%
                                                                                                      2532
                                                                                                             4822 126 14043
                                                                                                                             1μF 20% 16V
                       Connector 3P m v 2.50 Wh
0344
       4822 267 10963
                                                                          330pF 5% 63V
                                                                                                      2534
                                                                                                             5322 126 10223
                                                                                                                             4.7nF 10% 63V
                                                   2202
                                                          5322 122 31863
                       Connector 3P m v 2.50 Ye
0355
        4822 267 11043
                                                                                                             4822 126 14491
                                                                                                                             2.2µF -20+80% 10V 0805
                                                   2203
                                                          5322 122 31863
                                                                          330pF 5% 63V
                                                                                                      2535
        4822 267 10963
                       Connector 3P m v 2.50 Wh
0356
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2536
                                                                                                                             100nF 10% 50V
                                                   2204
                                                          2238 586 59812
                                                                                                             4822 126 14585
        4822 267 10967
                        Connector 3P m v 2.50 Bk
0360
                                                          4822 124 40248
                                                                          10μF 20% 63V
                                                                                                      2537
                                                                                                             4822 126 14585
                                                                                                                             100nF 10% 50V
                                                   2205
0361
        4822 267 10974
                       Connector 9P m v 2.50 Wh
                                                   2206
                                                          5322 122 32531
                                                                          100pF 5% 50V
                                                                                                      2538
                                                                                                             4822 124 40433
                                                                                                                             47µF 20% 25V
                       Connector 9P m v 2.50 Wh
0362
        4822 267 10974
                                                                          330pF 5% 63V
                                                                                                                             100nF +80/-20% 50V 0603
                                                                                                             2238 586 59812
                                                   2209
                                                          5322 122 31863
                                                                                                      2539
                       Connector 7P m v 2.50 Wh
        2422 025 14904
0371
                                                                          100pF 5% 50V
                                                                                                                             47µF 20% 25V
                                                   2210
                                                          5322 122 32531
                                                                                                      2540
                                                                                                             4822 124 40433
0372
        4822 267 10979
                        Connector 9P m v 2.50 Bk
                                                   2212
                                                           4822 124 40248
                                                                          10µF 20% 63V
                                                                                                      2541
                                                                                                             5322 122 32654
                                                                                                                             63V 22nF 10%
                        Connector 7P m v 2.50 Bk
0373
        4822 267 10978
                                                                                                                             100nF +80/-20% 50V 0603
                                                   2213
                                                          2238 586 59812
                                                                          100nF +80/-20% 50V 0603
                                                                                                      2545
                                                                                                             2238 586 59812
1001
        4822 242 10972
                        Crystal 6MHz
                                                   2215
                                                           5322 122 31863
                                                                          330pF 5% 63V
                                                                                                      2550
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
1101
        3139 147 20221
                        Splitter PS1318/I
                                                   2216
                                                          5322 122 31863
                                                                          330pF 5% 63V
                                                                                                      2553
                                                                                                             4822 126 14585
                                                                                                                             100nF 10% 50V
                        Tuner UV1318S/A P-3
       3139 147 20181
1102▲
                                                                          100pF 5% 50V
                                                                                                                             100nF 10% 50V
                                                                                                      2554
                                                                                                             4822 126 14585
                                                   2217
                                                           5322 122 32531
        4822 242 10688
                        Filter OFWK9456M
1105
                                                   2219
                                                           5322 122 31863
                                                                          330pF 5% 63V
                                                                                                      2555
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
1107
        4822 242 72211
                        Filter 5.5 MHz
                                                          5322 122 32531
                                                                          100pF 5% 50V
                                                                                                                             100nF 10% 50V
                                                   2220
                                                                                                      2556
                                                                                                             4822 126 14585
1109
        4822 242 81436
                        Filter OFWK3953M
                                                   2221
                                                           4822 126 14076
                                                                          220nF 25V. 20%
                                                                                                      2557
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
1198
        3104 301 08351
                        Cable phono-phono 120mm
                                                   2222
                                                          4822 124 81286
                                                                          47\mu F 20\% 16V
                                                                                                      2558
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
1200
        2422 026 05254
                        Socket cinch 2P f h Wh/Rd
                                                   2224
                                                          5322 122 32531
                                                                          100pF 5% 50V
                                                                                                      2560
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
1201
                        Socket 2 x SCART
        4822 267 10771
                                                   2226
                                                           5322 122 32531
                                                                          100pF 5% 50V
                                                                                                                             47µF 20% 16V
                                                                                                      2561
                                                                                                             4822 124 81286
1202
        4822 267 10771
                        Socket 2 x SCART
                                                           5322 122 31863
                                                                          330pF 5% 63V
                                                   2228
                                                                                                      2562
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
        5322 242 73686
                        Crystal 12 MHz
1305
                                                   2229
                                                           5322 122 31863
                                                                          330pF 5% 63V
                                                                                                      2564
                                                                                                             4822 122 33177
                                                                                                                             10nF 20% 50V
1525
        4822 242 10695
                        Crystal 4.433 619 MHz
                                                                          100pF 5% 50V
                                                   2240
                                                           5322 122 32531
                                                                                                      2567
                                                                                                             5322 126 10733
                                                                                                                             680pF 5% 50V
1528
        4822 242 10697
                        Crystal 3.579 545 MHz
                                                                                                                             100pF 5% 50v 0603
                                                                          100pF 5% 50V
                                                   2241
                                                          5322 122 32531
                                                                                                      2568
                                                                                                             2020 552 94427
1751
        4822 242 10434
                        Crystal 18.432 MHz
                                                                                                                             10nF 20% 50V
                                                                          10uF 20% 16V
                                                   2242
                                                           4822 124 23002
                                                                                                      2569
                                                                                                             4822 122 33177
8010
        3104 311 03781
                        Cable 9P/280/9P Rd
                                                                                                                             100pF 5% 50v 0603
                                                   2243
                                                           4822 126 14076
                                                                          220nF 25V. 20%
                                                                                                      2570
                                                                                                             2020 552 94427
                        Cable 9P/100/9P Wh
8040
        3104 311 02621
                                                   2244
                                                                                                                             10μF 20% 10V 1206
                                                           4822 126 14076
                                                                          220nF 25V, 20%
                                                                                                      2572
                                                                                                             2020 004 90283
8061
        3104 311 02621
                        Cable 9P/100/9P Wh
                                                   2245
                                                           4822 126 14076
                                                                          220nF 25V. 20%
                                                                                                      2751
                                                                                                             2238 586 59812
                                                                                                                             100nF +80/-20% 50V 0603
8062
        3104 311 02621
                        Cable 9P/100/9P Wh
                                                                          220nF 25V. 20%
                                                   2246
                                                           4822 126 14076
                                                                                                      2752
                                                                                                             4822 126 13692
                                                                                                                             47pF 1% 63V
8072
        3104 311 03441 Cable 9P/60/9P Bk
                                                                          220nF 25V, 20%
                                                           4822 126 14076
                                                                                                                             220nF 20% 50V
                                                   2247
                                                                                                      2753
                                                                                                             4822 122 32927
                                                                                                                             470pF 5% 63V
                                                           4822 126 14076
                                                                          220nF 25V. 20%
                                                                                                             5322 122 32268
                                                   2248
                                                                                                      2754
                                                   2249
                                                           4822 126 14076
                                                                          220nF 25V. 20%
                                                                                                      2755
                                                                                                             5322 122 32268
                                                                                                                             470pF 5% 63V
---
                                                   2250
                                                           4822 126 14076 220nF 25V. 20%
                                                                                                      2756
                                                                                                             5322 122 32268
                                                                                                                             470pF 5% 63V
                                                   2251
                                                           4822 124 80151
                                                                          47μF 20% 16V
                                                                                                      2757
                                                                                                             5322 122 32268
                                                                                                                             470pF 5% 63V
2001
        4822 126 13482 470nF 80/20% 16V
                                                           4822 126 14076
                                                                          220nF 25V, 20%
                                                   2252
                                                                                                      2758
                                                                                                             5322 122 32268
                                                                                                                             470pF 5% 63V
        2238 586 59812 100nF +80/-20% 50V 0603
                                                           4822 126 14076 220nF 25V. 20%
                                                                                                             5322 122 32268 470pF 5% 63V
                                                   2253
                                                                                                     2759
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EN 110	10.	F21RE AB	Spare Parts List
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2760	5322 122 32268 470pF 5% 63V	3042	4822 051 20474	470k 5% 0.1W	3236	4822 117 11927	75Ω 1% 0.1W
2761	4822 122 32927 220nF 20% 50V	3043	4822 051 30472		3239	4822 051 30102	
2762	4822 122 32927 220nF 20% 50V	3045	4822 051 20273		3240	4822 117 11927	
2763 2764	5322 122 32268 470pF 5% 63V 5322 122 32268 470pF 5% 63V	3047 3048		24k 1% 0.62W 0603 150Ω 5% 0.63W	3241	4822 117 10353	
2765	4822 124 12095 100μF 20% 16V	3059		680Ω 5% 0.062W	3242 3243	4822 051 20822 4822 117 10353	
2766	4822 124 12095 100μF 20% 16V	3062		47k 1% 0.063W 0603	3244	4822 051 10102	
2767	5322 122 32286 3.3pF 5% 50V	3063	4822 051 30472		3245	4822 051 20392	
2768	5322 122 32286 3.3pF 5% 50V	3066	4822 117 10833	10k 1% 0.1W	3246	4822 051 10102	
2769	4822 126 13482 470nF 80/20% 16V	3067	4822 051 30472		3248		330Ω 1% 0805 1.25W
2770	5322 126 11583 10nF 10% 50V 0603	3068	4822 051 30103		3249		2k7 1% 0.1W 0805
2771 2772	4822 122 33177 10nF 20% 50V 4822 126 13956 68pF 5% 63V 0603	3069	4822 051 30689 4822 051 30103	68Ω 5% 0.063W 0603	3250	4822 117 11139	
2773	5322 122 31647 1nF 10% 63V	3070 3071	4822 051 30103		3251 3252	4822 051 30102	33Ω 1% 0.1W 0805
2774	5322 122 31647 1nF 10% 63V	3072	4822 117 10834		3253	4822 051 20391	
2775	4822 126 13482 470nF 80/20% 16V	3073	4822 051 20472		3254	4822 051 10102	
2776	4822 126 13956 68pF 5% 63V 0603	3074	4822 117 10837	100k 1% 0.1W	3255	4822 051 10102	
2777	4822 124 23002 10μF 20% 16V	3075	4822 051 30472		3256	4822 117 11927	
2778	4822 124 23002 10μF 20% 16V	3076	4822 051 30472		3257	4822 117 10353	
2779 2780	4822 126 14585 100nF 10% 50V 4822 124 23002 10μF 20% 16V	3080 3090		4 x 100Ω 5% 1206 4 x 100Ω 5% 1206	3258 3259	4822 117 10353	
2781	4822 126 14585 100nF 10% 50V	3090		4 x 100Ω 5% 1206 4 x 100Ω 5% 1206	3262		27k 5% 0.062W 47k 1% 0.063W 0603
2782	4822 124 23002 10μF 20% 16V	3092		4 x 100Ω 5% 1206	3263		220Ω 5% 0.062W
2783	4822 126 13482 470nF 80/20% 16V	3093		4 x 100Ω 5% 1206	3264	4822 051 20822	
2784	4822 126 13482 470nF 80/20% 16V	3094		4 x 100Ω 5% 1206	3265		2k7 1% 0.1W 0805
2785	5322 122 31647 1nF 10% 63V	3095		4 x 100Ω 5% 1206	3266	4822 117 10833	
2786 2787	5322 122 31647 1nF 10% 63V 5322 126 10223 4.7nF 10% 63V	3096		4 x 100Ω 5% 1206	3267	4822 051 30102	
2788	5322 126 10223 4.7hF 10% 63V 5322 126 10223 4.7hF 10% 63V	3097 3098		4 x 100Ω 5% 1206 4 x 100Ω 5% 1206	3268 3269	4822 051 30102	1k 5% 0.062W 560Ω 5% 0.062W
2790	4822 122 33761 22pF 5% 50V	3099		4 x 100Ω 5% 1206 4 x 100Ω 5% 1206	3270	4822 051 30561	
2791	4822 122 33761 22pF 5% 50V	3102		2k2 5% 0.1W 0805	3271	4822 051 10102	
2792	5322 126 11583 10nF 10% 50V 0603	3103	4822 051 20008		3272	4822 117 10353	
2793	4822 122 33177 10nF 20% 50V	3104	4822 051 20008		3273	4822 051 20822	8k2 5% 0,1W
2801	4822 122 33761 22pF 5% 50V	3106	4822 051 20479		3274		2k7 1% 0.1W 0805
2802	4822 124 12398 4.7μF 20% 25V	3110		2k2 5% 0.1W 0805	3275		33Ω 5% 0.062W
2803 2804	4822 124 12398 4.7μF 20% 25V 4822 122 32927 220nF 20% 50V	3111 3112	4822 117 11449 4822 051 20472	2k2 5% 0.1W 0805	3276		390Ω 5% 0.062W
2805	4822 122 32927 220nF 20% 50V	3114	4822 051 20472		3277 3278		2k2 5% 0.062W 330Ω 5% 0.062W
2808	4822 124 12095 100μF 20% 16V	3118	4822 051 20391		3279		150Ω 5% 0.062W
2809	5322 126 10511 1nF 5% 50V	3119	4822 051 20479		3281		1k8 1% 0.063W 0603
2810	5322 126 10511 1nF 5% 50V	3124	4822 051 30101	100Ω 5% 0.062W	3282		100k 1% 0603 0.62W
2811	5322 126 10511 1nF 5% 50V	3133		2k7 1% 0.1W 0805	3283	4822 051 30683	
2846	4822 124 23002 10μF 20% 16V	3135	4822 051 20472		3284		100k 1% 0603 0.62W
2847 2848	4822 124 23002 10μF 20% 16V 4822 124 23002 10μF 20% 16V	3136 3137	4822 117 11503		3285	4822 051 30683	
2849	4822 124 23002 10µF 20% 16V	3138	4822 051 10102 4822 117 11448		3286 3287		100k 1% 0603 0.62W 68k 5% 0.062W
2852	4822 122 32927 220nF 20% 50V	3139	4822 117 11139		3288		100Ω 5% 0.062W
2853	4822 122 32927 220nF 20% 50V	3140		2k7 1% 0.1W 0805	3289		100Ω 5% 0.062W
2854	4822 122 32927 220nF 20% 50V	3141		5k6 5% 0.063W 0603	3290	4822 052 10478	4Ω7 5% 0.33W
2855	4822 122 32927 220nF 20% 50V	3142	4822 051 30102		3291		560Ω 5% 0.062W
2856 2857	4822 122 32927 220nF 20% 50V	3143	4822 051 30102		3292		10k 5% 0.062W
2858	4822 122 32927 220nF 20% 50V 4822 122 32927 220nF 20% 50V	3145 3146	4822 051 30391 4822 051 20223	390Ω 5% 0.062W	3293		470Ω 5% 0.062W
2859	4822 122 32927 220nF 20% 50V	3147	4822 052 10109		3294 3295		10k 5% 0.062W 470Ω 5% 0.062W
2860	4822 122 32927 220nF 20% 50V	3152	4822 051 20471		3296	4822 051 30103	
2861	4822 122 32927 220nF 20% 50V	3153	4822 051 10102		3297	4822 051 30103	
2864	4822 124 81151 22μF 50V	3154	4822 117 11503		3298		100k 1% 0603 0.62W
2867	4822 122 32927 220nF 20% 50V	3155	4822 117 11503		3299	4822 051 30683	
2868 2869	4822 122 32927 220nF 20% 50V 4822 124 40196 220μF 20% 16V	3200 3201	4822 117 10353 4822 117 10353		3300	4822 052 10688	
2870	4822 122 32927 220nF 20% 50V	3202	4822 117 10353		3302 3303		100Ω 5% 0.062W 100Ω 5% 0.062W
2871	4822 122 32927 220nF 20% 50V	3203	4822 117 10353		3304		100Ω 5% 0.062W
2872	4822 124 40207 100μF 20% 25V	3204	4822 052 10688		3307	4822 051 30102	
2873	5322 126 10511 1nF 5% 50V	3205	4822 051 20471		3308	4822 051 30102	1k 5% 0.062W
2890	4822 122 33177 10nF 20% 50V	3206	4822 117 11927		3309		33k 5% 0.062W
2891 2897	4822 126 14585 100nF 10% 50V 2238 586 59812 100nF +80/-20% 50V 0603	3207 3208	4822 051 20561		3310	4822 051 20332	
2037		3209	4822 051 20399 4822 117 11927		3311 3312	4822 051 30102	
		3210	4822 117 11927		3317	4822 051 30102	100k 1% 0603 0.62W 1k 5% 0.062W
		3211	4822 117 11927		3318	4822 051 30102	
3001	2322 704 66201 620Ω 1% 0603	3212	2322 734 63609		3321	4822 051 30102	
3003	3198 031 14710 4 x 470Ω 5% 1206	3213	4822 117 11927		3322	4822 051 30102	
3004	3198 031 14710 4 x 470Ω 5% 1206	3214	4822 051 30102		3323	4822 051 20393	
3005	3198 031 14710 4 x 470Ω 5% 1206	3215 3216	4822 117 11927 4822 051 20822		3324	4822 051 20274	
3006	4822 051 30103 10k 5% 0.062W	3217	4822 051 30102		3325 3326	4822 051 30102	220Ω 5% 0.062W
3007	5322 117 13053 6k8 1% 0.063W 0603	3218	4822 051 20392		3330		680k 5% 0.062W
3009 3010	3198 031 14710 4 x 470Ω 5% 1206	3219	4822 051 10102		3331		47k 1% 0.063W 0603
3011	5322 117 13042 3K9 1% 0.063W 0603 4822 051 30472 4k7 5% 0.062W	3220	4822 051 10102	1k 2% 0.25W	3332	4822 051 30183	
3023	3198 031 14710 4 x 470Ω 5% 1206	3221	4822 117 10353		3340	4822 051 30123	
3024	4822 051 30471 470Ω 5% 0.062W	3222 3223	4822 117 10353		3341	4822 051 10102	
3027	3198 031 14710 4 x 470Ω 5% 1206	3223	4822 117 10353 4822 117 10353		3342	4822 051 30103	
3028	3198 031 14710 4 x 470Ω 5% 1206	3225	4822 052 10688		3343 3344	4822 117 10837 4822 051 30103	
3029	4822 051 30471 470Ω 5% 0.062W	3226	4822 051 30102		3350		470k 5% 0.062W
3030 3031	3198 031 11010 4 x 100Ω 5% 1206 4822 117 13577 330Ω 1% 0805 1 25W	3227	4822 051 20399		3351	4822 117 12891	
3032	4822 117 13577 330Ω 1% 0805 1.25W 4822 051 30471 470Ω 5% 0.062W	3228	4822 051 30101	100Ω 5% 0.062W	3352	4822 051 30332	3k3 5% 0.062W
3033	4822 117 13523 220Ω 5% RESN 0.63W	3229	4822 051 30103		3353	4822 117 12903	1k8 1% 0.063W 0603
3034	4822 051 30103 10k 5% 0.062W	3230	4822 051 20561		3369	4822 051 30103	
3035	4822 051 30103 10k 5% 0.062W	3231 3232	2322 734 63609 4822 117 12521		3370	4822 051 30103	
3036	4822 117 13524 2.2k 5% 0.63W	3233	4822 117 12521		3400 3401	4822 051 20391 4822 051 20391	
3039 3041	4822 051 30333 33k 5% 0.062W	3234	4822 051 20399		3402	4822 051 20391	
J U-4 I	4822 117 10833 10k 1% 0.1W	3235	4822 117 10353		3404	4822 051 20008	
		-			-		

3405	4822 051 20008	Jumper 0805	3858	4822 117 10833	10k 1% 0.1W			
3406	4822 051 20008		3859	4822 117 10833		-> -		
3407	4822 117 10361		3860	4822 117 10833		"		
3408			3861			0004	4000 100 11400	DLVAGGEOA
	4822 117 10361			4822 117 10833		6001	4822 130 11422	
3409	4822 117 10361		3866	4822 117 11373		6002	4822 130 11422	PLVA2650A
3420	4822 117 12925	47k 1% 0.063W 0603	3867	4822 117 11373	100Ω 1% 0805	6003	4822 130 11422	PLVA2650A
3422	4822 117 11449	2k2 5% 0.1W 0805	3868	4822 051 20008	Jumper 0805	6004	4822 130 11422	PLVA2650A
3423	4822 051 20008		3869	4822 051 20008		6006	4822 130 11422	
3426		•	3872	4822 117 10833	•			
	4822 051 30333					6008	4822 130 11422	
3427		150k 5% 0.062W	3873	4822 117 10833		6009	4822 130 11422	
3428	4822 051 30222	2k2 5% 0.062W	3877	4822 051 20332	3k3 5% 0.1W	6012	4822 130 11422	PLVA2650A
3429	4822 051 30271	270Ω 5% 0.062W	3878	4822 051 20332	3k3 5% 0.1W	6013	4822 130 11422	PLVA2650A
3431	4822 051 30008		3879	4822 051 20332		6017	4822 130 11422	
3432		100Ω 5% 0.062W	3880	4822 051 20332		6019	4822 130 11422	
3433	4822 051 30101	100Ω 5% 0.062W	3881	4822 051 20332	3k3 5% 0.1W	6021	4822 130 11422	PLVA2650A
3434	4822 052 10478	4Ω7 5% 0.33W	3882	4822 051 20332	3k3 5% 0.1W	6023	4822 130 11422	PLVA2650A
3436	4822 051 20008		3890	4822 051 30008		6025	4822 130 11423	
3438	4822 117 10834		3892	4822 051 20008		6026	4822 130 11423	
3439	4822 117 10833	10k 1% 0.1W	3895	4822 051 30103	10k 5% 0.062W	6037	9322 129 34685	BZM55-C3V9
3440	4822 051 20393	39k 5% 0.1W	3899	4822 051 20008	Jumper 0805	6039	4822 130 83757	BAS216
3441	4822 117 10833		4005	4822 051 20008		6040	9322 129 37685	
3442	4822 051 20822		4008	4822 051 30008				
						6101	9322 149 10685	
3443	4822 116 83933	15k 1% 0.1W	4010	4822 051 30008	Jumper 0603	6103	4822 130 11525	155356
3454	4822 051 20008	Jumper 0805	4012	4822 051 30008	Jumper 0603	6104	4822 130 11525	1SS356
3460	4822 051 30008	Jumper 0603	4015	4822 051 20008	Jumper 0805	6106	4822 130 83757	BAS216
3461	4822 051 30223		4017	4822 051 30008	Jumper 0603	6107	4822 130 83757	
3521			4021		•			
		100k 1% 0603 0.62W		4822 051 30008		6200	9322 129 40685	
3530		100Ω 5% 0.062W	4023	4822 051 30008		6201	4822 130 10852	
3531	4822 051 30101	100Ω 5% 0.062W	4024	4822 051 30008	Jumper 0603	6202	9322 129 40685	BZM55-C10
3532	4822 116 83933		4027	4822 051 30008		6203	9322 129 40685	
3538	4822 052 10228		4029	4822 051 30008	•	6204	4822 130 10852	
3545		470Ω 5% 0.062W	4105	4822 051 20008		6205	9322 129 40685	
3546	4822 051 30471	470Ω 5% 0.062W	4109	4822 051 20008	Jumper 0805	6206	9322 129 40685	BZM55-C10
3551	4822 051 30271	270Ω 5% 0.062W	4110	4822 051 20008	Jumper 0805	6207	4822 130 10852	BZX284-C6V8
3554	4822 051 10102		4111	4822 051 20008		6208	9322 129 40685	
			4226		•			
3556	4822 117 10833			4822 051 20008		6209	9322 129 40685	
3557	4822 051 30479	47Ω 5% 0.062W	4227	4822 051 20008	Jumper 0805	6210	4822 130 10852	BZX284-C6V8
3558	4822 051 20225	2M2 5% 0805	4316	4822 051 20008	Jumper 0805	6211	4822 130 10852	BZX284-C6V8
3565	4822 051 30101	100Ω 5% 0.062W	4402	4822 051 20008	Jumper 0805	6212	4822 130 10852	BZX284-C6V8
3566		100Ω 5% 0.062W	4403	4822 051 20008		6213	4822 130 10852	
					•			
3567	4822 117 11373		4410	4822 051 20008		6214	9322 129 40685	
3568	4822 051 20471	470Ω 5% 0.1W	4413	4822 051 20008	Jumper 0805	6215	9322 129 40685	BZM55-C10
3569	4822 051 30479	47Ω 5% 0.062W	4414	4822 051 20008	Jumper 0805	6216	9322 129 40685	BZM55-C10
3570	3198 031 11010	4 x 100Ω 5% 1206	4420	4822 051 20008	Jumper 0805	6217	9322 129 40685	BZM55-C10
3590	4822 117 11454		4423	4822 051 20008		6218	9340 548 61115	
3750	4822 052 10228		4424	4822 051 20008	•	6219	4822 130 10852	
3753	4822 051 30008	Jumper 0603	4426	4822 051 30008	Jumper 0603	6220	9322 129 40685	BZM55-C10
3754	4822 051 30008	Jumper 0603	4430	4822 051 20008	Jumper 0805	6221	9322 129 40685	BZM55-C10
3755	4822 051 30101	100Ω 5% 0.062W	4431	4822 051 20008	Jumper 0805	6222	4822 130 10852	
3756		100Ω 5% 0.062W	4432	4822 051 20008		6223	9322 129 40685	
3758	4822 051 30683		4433	4822 051 20008		6224	9322 129 40685	BZM55-C10
3760	4822 051 30683	68k 5% 0.062W	4434	4822 051 20008	Jumper 0805	6225	4822 130 10852	BZX284-C6V8
3761	4822 051 30682	6k8 5% 0.062W	4435	4822 051 20008	Jumper 0805	6226	4822 130 10852	BZX284-C6V8
3762	4822 051 20472		4500	4822 051 20008		6227	4822 130 10852	
3765	4822 051 30683		4700	4822 051 20008			4822 130 10852	
						6228		
3766	4822 051 30103		4701	4822 051 20008		6229	9322 129 40685	
3767	4822 051 30683	68k 5% 0.062W	4734	4822 051 20008	Jumper 0805	6230	9322 129 40685	BZM55-C10
3768	4822 051 30103	10k 5% 0.062W	4735	4822 051 20008	Jumper 0805	6231	9322 129 40685	BZM55-C10
3769	4822 117 11507		4745	4822 051 20008		6232	9322 129 40685	
3770	4822 117 11507		4805	4822 051 20008			4822 130 10852	
						6233		
3771	4822 116 83933		4806	4822 051 20008		6234	9322 129 40685	
3772	4822 116 83933	15k 1% 0.1W	4810	4822 051 30008	Jumper 0603	6235	9322 129 40685	BZM55-C10
3773	4822 051 20472	4k7 5% 0.1W	4812	4822 051 20008	Jumper 0805	6236	9322 129 40685	BZM55-C10
3780	4822 051 30682	6k8 5% 0.062W	4813	4822 051 20008	Jumper 0805	6237	9322 129 40685	
3781		560Ω 5% 0.062W			•	6238	4822 130 11528	
3783	4822 117 11373							
						6240	9322 129 40685	
3784	4822 051 30008		I			6241	9322 129 40685	
3785	4822 051 30008		5002	1999 157 11775	6 8u H 5% 5V2	6242	9322 129 40685	
3796	4822 051 20121	120Ω 5% 0,1W		4822 157 11775		6243	9322 129 40685	BZM55-C10
3797	4822 051 20121		5101	4822 157 11775	•	6244	4822 130 10852	
3798	4822 117 10834		5102	3198 018 33370	0.33μH 10% 0805		4822 130 10632	
			5103		Coil var. 40.4MHz	6250		
3799		47k 1% 0.063W 0603	5106	4822 157 10977		6340	4822 130 83757	
3800	4822 051 30682	6k8 5% 0.062W				6341	4822 130 11594	BZX284-C47
3801	4822 051 30103	10k 5% 0.062W	5108		Coil var.78MHz	6344	4822 130 83757	
3802	4822 117 12891		5301		6.8μH 10% 0805	6350	4822 130 82346	
			5302	4822 157 11876	6.8µH 10% 0805	1		
3828	4822 051 30008		5305	4822 157 11119		6420	9322 129 37685	
3829	4822 051 30008		5306	4822 157 11119		6422	4822 130 83757	
3830	4822 051 20121	120Ω 5% 0,1W				6424	4822 130 83757	BAS216
3831	4822 051 20121		5307	4822 157 11119		6429	9322 129 37685	
3832	4822 051 10102		5501	4822 157 11775		6430	4822 130 83757	
3833			5502	4822 157 11775	6.8µH 5% 5X3	•		
		10k 5% 0.062W	5540	4822 157 71304		6431	4822 130 83757	
3840		10k 5% 0.062W	5559	4822 157 11775		6432	4822 130 83757	
3844	4822 117 12925	47k 1% 0.063W 0603				6750	9322 150 82685	BAT60J
3845		47k 1% 0.063W 0603	5560	4822 157 11775		6751	9322 129 40685	
3846		47k 1% 0.063W 0603	5562	4822 157 11775		6752	9322 129 40685	
3847			5564▲	4822 252 51175	Fuse 2.5A 65V MP250			
		47k 1% 0.063W 0603			Fuse 2.5A 65V MP250	6753	9322 129 40685	
3850	4822 051 20332		5751	4822 157 11775		6754	9322 129 40685	
3851	4822 051 20332	3k3 5% 0.1W				6755	9322 129 40685	BZM55-C10
3852		22k 5% 0.062W	5752	4822 157 11775		6756	9322 129 40685	
3853		22k 5% 0.062W	5753	4822 157 11775		6757	9322 150 82685	
3854	4822 117 10833		5757	4822 157 11876	6.8μH 10% 0805			
3855			5759	4822 157 70503	4.7μH 5%	6759	4822 130 83757	DM3210
	4822 117 10833		1		•	l		
3856	4822 117 10833		Į.			l		
3857	4822 117 10833	IUK 1% U.1W	ŀ			l		

F21RE AB Spare Parts List

7	420 424 501	4822 130 60373 4822 130 60373 9352 625 24518	BC856B	2765 2766 2767	2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	3870 3999 4704	4822 051 30008 4822 051 30562 4822 051 30008	5k6 5% 0.063W 0603
7 7	502 555	5322 130 60159 4822 130 60373	BC846B BC856B	2769 2773	2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4707 4708	4822 117 12662 4822 117 12662	4 x 10Ω 5% 4 x 10Ω 5%
7 7	560 561 751		BC846B MSP3410D-PS-C5	2775 2777 2779	2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4709 4710 4711	4822 117 12662 4822 117 12662 4822 051 30008	4 x 10Ω 5% Jumper 0603
7	752 753 756	5322 209 11102 5322 209 11102 4822 209 30095	HEF4052BT LM833D	2781 2782 2783	2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4712 4713 4714	4822 051 30008	100nF +80/-20% 50V 0603 Jumper 0603
	757	9322 060 73668	MO00470DD0	0704					100-E .00/ 000/ F0V 0000
7	757 773 774	5322 130 60159	BC846B	2784 2785	2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4715 4716	4822 051 30008	
7 7 7			BC846B BC846B TEA6422D	2785 2786 2787 2788	2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4716 4717 4721 4722	4822 051 30008 4822 051 30008 4822 051 30008 2238 586 59812	Jumper 0603 Jumper 0603 Jumper 0603 100nF +80/-20% 50V 0603
7 7 7 7	773 774 777 801	5322 130 60159 5322 130 60159 9322 116 87668 5322 130 60159	BC846B BC846B TEA6422D	2785 2786 2787	2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4716 4717 4721	4822 051 30008 4822 051 30008 4822 051 30008 2238 586 59812 4822 051 30008	Jumper 0603 Jumper 0603 Jumper 0603 100nF +80/-20% 50V 0603 Jumper 0603 100nF +80/-20% 50V 0603
7 7 7 7 -	773 774 777 801	5322 130 60159 5322 130 60159 9322 116 87668 5322 130 60159 ure Box [L]	BC846B BC846B TEA6422D	2785 2786 2787 2788 2789 2790 2791 2792 2793	2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 4822 124 40248 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 10pF 20% 63V 10pF 20% 63V 100nF +80/-20% 50V 0603	4716 4717 4721 4722 4723 4724 4726 4731 4733	4822 051 30008 4822 051 30008 4822 051 30008 2238 586 59812 4822 051 30008 2238 586 59812 4822 051 30008 4822 051 30008 4822 051 30008	Jumper 0603 Jumper 0603 Jumper 0603 100nF +80/-20% 50V 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603
7 7 7 7 - F - V	773 774 777 801 Featu Variou	5322 130 60159 5322 130 60159 9322 116 87668 5322 130 60159 ure Box [L]	BC846B BC846B TEA6422D BC846B	2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796	2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 4822 124 40248 2238 586 59812 4822 124 40248 2238 586 59812 2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 10μF 20% 63V 10μF 20% 63V 10μF 20% 63V 10μF 20% 63V 10μF +80/-20% 50V 0603 10μF +80/-20% 50V 0603	4716 4717 4721 4722 4723 4724 4726 4731	4822 051 30008 4822 051 30008 4822 051 30008 2238 586 59812 4822 051 30008 2238 586 59812 4822 051 30008 4822 051 30008	Jumper 0603 Jumper 0603 Jumper 0603 100nF +80/-20% 50V 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603
7 7 7 7 7 7 7 7 7 7 7 7 9 9 9 9 9 9 9 9	773 774 777 801 Featu Variou 025 026 361 362	5322 130 60159 5322 130 60159 9322 116 87668 5322 130 60159 ure Box [L] us 3104 301 23824 3104 301 23834 4822 267 10974	BC846B BC846B TEA6422D BC846B FBX-shield top FBX-shield botom Connector 9P m v 2.50 Wh Connector 9P m v 2.50 Wh	2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799	2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 4822 124 40248 2238 586 59812 4822 124 40248 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812 2238 586 59812	100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 10μF 20% 63V 100nF +80/-20% 50V 0603 10μF 20% 63V 100nF +80/-20% 50V 0603 10μF 20% 63V 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603 100nF +80/-20% 50V 0603	4716 4717 4721 4722 4723 4724 4726 4731 4733 4735 4750	4822 051 30008 4822 051 30008 4822 051 30008 2238 586 59812 4822 051 30008 2238 586 59812 4822 051 30008 4822 051 30008 4822 051 30008 4822 051 30008	Jumper 0603 Jumper 0603 Jumper 0603 100nF +80/-20% 50V 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603 Jumper 0603
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7703
       4822 209 73852 PMBT2369
                                                    2207
                                                           4822 126 14525 47pF 5% 1kV
                                                                                                        6105
                                                                                                               4822 130 42606 BYD33J
7704
       4822 209 73852 PMBT2369
                                                    2310
                                                           5322 122 32531 100pF 5% 50V
                                                                                                               4822 130 81274 MBR745
                                                                                                        6106
7705
       4822 209 17398
                       LD1117DT33
                                                    2311
                                                           2020 021 91506
                                                                            1000µF 20% 16V
                                                                                                        6107
                                                                                                               4822 130 42606 BYD33J
                                                           4822 126 14585 100nF 10% 50V
                                                                                                               4822 130 30621
7706
       9322 160 50668
                       LD1117DT25
                                                    2312
                                                                                                                                1N4148
1N4148
                                                                                                        6108
                                                                                                               4822 130 30621
7711
       2422 486 80938
                       Socket 32p f
                                                    2313
                                                           4822 124 40196 220µF 20% 16V
                                                                                                        6109
                       74HC573D
                                                           4822 126 14585 100nF 10% 50V
       5322 209 60424
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                                                                                                        6110
                                                                                                               4822 130 42606 BYD33J
7713
       9352 688 09557 SAA4978H/V204 Y
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                                                                                                                                BZT03-C300
7714
       9965 000 02179
                       MS81V04160-25TB
                                                                                                        6202
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                       MSM54V12222B-25JS
7717
       9322 183 81668
                                                                                                        6203
                                                                                                               4822 130 31083
                                                                                                                                BYW55
7718
       9352 695 58557
                        SAA4993H/V1
                                                                                                               4822 130 80858
                                                                                                        6203
                                                                                                                                1N5062
                                                    3000
                                                           4822 053 21475 4M7 5% 0,5W
                       MSM54V12222B-25JS
       9322 183 81668
                                                                                                        6204
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                                                                                                                                BYW55
                                                    3001
                                                           4822 053 21475 4M7 5% 0,5W
7727
       5322 130 60159 BC846B
                                                                                                        6204
                                                                                                               4822 130 80858
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                                                    3002
                                                           2322 595 90021 VDR 1mA/495V MAX 850V
7741
       4822 209 73852 PMBT2369
                                                                                                        6310
                                                                                                               9322 161 76682
                                                                                                                                SB340L-7024
                                                           4822 053 21225 2M2 5% 0.5W
                                                    3003
                                                                                                        6401
                                                                                                               4822 130 30621
                                                                                                                                1N4148
                                                    3005
                                                           2120 103 90057
                                                                           100Ω 20% 0.5W
                                                                                                        6402
                                                                                                               4822 130 30621
                                                                                                                                1N4148
                                                           4822 117 13473 22k 5% 2,5W
                                                    3010
Power Supply [PS]
                                                    3011
                                                           4822 050 21003 10k 1% 0.6W
                                                                                                        CE.
                                                           3012
Various
                                                    3013
                                                    3014
                                                           4822 050 21008 1Ω 1% 0,6W
                                                                                                        7000
                                                                                                               9322 151 01687 STP6NC60FP
                                                           4822 050 22208 2.2Ω 1% 0,6W
0005
       3122 121 35811 Earth contact
                                                    3015
                                                                                                        7001
                                                                                                               4822 209 15684 MC44603AP
0011
       3122 421 60171 Spring
                                                    3016
                                                           4822\ 116\ 52186\ \ 22\Omega\ 5\%\ 0.5W
                                                                                                        7002
                                                                                                               9322 149 04682
                                                                                                                               TCET1102
       2422 030 00304 Socket 2P m h mains
0300
                                                    3017
                                                           4822 051 20472 4k7 5% 0.1W
4822 117 11149 82k 1% 0,1W
                                                                                                        7011
                                                                                                               4822 209 16406 TL431ACD
0306
       4822 265 41391
                       Connector 9p m
                                                    3030
                                                                                                        7101
                                                                                                               4822 130 60511 BC847B
       2422 025 12485
                       Connector 11p m
                                                    3031
                                                           4822 117 10833 10k 1% 0.1W
                                                                                                        7200
                                                                                                               9322 037 99682
                                                                                                                                TNY256P
       4822 265 11253 Fuse holder 2p
4822 252 60151 Sparkgap DSP-501N-A21F
0320
                                                           4822 051 20223 22k 5% 0.1W
                                                                                                               4822 209 16406
                                                                                                                                TL431ACD
                                                    3032
                                                                                                        7202
1000
                                                    3033
                                                           4822 116 83933 15k 1% 0.1W
                                                                                                        7203
                                                                                                               9322 149 04682
                                                                                                                                TCET1102
       2422 086 10912 Fuse T2.5A 250V 5X20
1001
                                                    3034
                                                           4822 116 83933 15k 1% 0.1W
                                                                                                        7401
                                                                                                               4822 130 42804 BC817-25
       9965 000 07786 Fuse T4.0A 250V
1101
                                                           4822 117 10361 680Ω 1% 0.1W
                                                    3035
                                                                                                        7402
                                                                                                               4822 130 60511 BC847B
       9965 000 07786 Fuse T4.0A 250V
                                                    3036
                                                           4822 116 83933 15k 1% 0.1W
1400
       2422 132 07411 Relay 1P 5V 5A
                                                            4822 051 20184 180k 5% 0.1W
                                                    3037
                                                    3038
                                                           4822\ 117\ 13577\ 330\Omega\ 1\%\ 0805\ 1.25W
                                                                                                        Standard Definition Panel [SD]
                                                    3039
                                                           4822 051 20223 22k 5% 0.1W
4822 117 11504 270Ω 1% 0.1W
--
                                                    3040
                                                                                                        Various
                                                    3041
                                                           4822 051 20182 1k8 5% 0.1W
       4822 126 14153 2.2nF 10% 1kV
2222 336 29147 330nF 20% 275V
2000
                                                           4822 050 23309 33Ω 1% 0,6W
                                                    3042
2001
                                                                                                               3122 121 67161 Earth sheet 3122 121 67161 Earth sheet
                                                                                                        0022
                                                    3043
                                                           4822\ 050\ 21501\ \ 150\Omega\ 1\%\ 0.6W
2003
       4822 126 14153 2.2nF 10% 1kV
                                                                                                        0023
                                                    3044
                                                           4822 051 20392 3k9 5% 0.1W
       4822 124 12415 220µF 20% 400V
                                                                                                        0304
                                                                                                               2422 025 12494
                                                                                                                               Connector 11P m h 2.50
                                                    3101
                                                           4822 050 23302 3k3 1% 0.6W
       3198 019 54710 470pF 10% 1kV
3198 019 51520 1.5nF 10% 1kV
2006
                                                                                                               2422 025 12494
                                                                                                                               Connector 11P m h 2.50
                                                                                                        0305
                                                    3102
                                                           4822 050 23302 3k3 1% 0,6W
2007
                                                                                                        0360
                                                                                                               2422 026 05252
                                                                                                                               Socket cinch 3P Rd/Bu/Gn
                                                           4822 116 52283 4k7 5% 0.5W
                                                    3104
       4822 126 12263 220pF 10% 2kV
2008
                                                                                                               2422 026 05253 Socket cinch 2P F Wh/Rd
                                                                                                        0361
                                                    3105
                                                           4822 116 52283 4k7 5% 0.5W
       5322 122 32531 100pF 5% 50V
2009
                                                                                                               2422 026 05252
                                                                                                                               Socket cinch 3P Rd/Bu/Gn
                                                                                                        0362
                                                    3106
                                                           4822\ 117\ 11373\ \ 100\Omega\ 1\%\ 0805
        4822 124 80144 220µF 20% 25V
2011
                                                                                                        0363
                                                                                                               2422 026 05253 Socket cinch 2P F Wh/Rd
                                                    3107
                                                           4822 051 10102 1k 2% 0.25W
       4822 126 14585 100nF 10% 50V
2012
                                                    3108
                                                           4822 051 20392 3k9 5% 0.1W
       4822 126 13695 82pF 1% 63V
2013
                                                    3109
                                                           4822 116 52175 100\Omega 5% 0.5W
                                                                                                        ⊣⊢
                       1nF 5% 50V
2014
       5322 126 10511
                                                    3110
                                                           4822 117 10362 7k5 1% 0,1W
2015
       4822 122 33735 27nF 10% 63V
                                                           2322 734 66803 68k 1% 0.1W 0805
4822 117 11504 270Ω 1% 0.1W
                                                    3111
                                                                                                        2006
                                                                                                               5322 122 32531 100pF 5% 50V
       5322 122 32531 100pF 5% 50V
5322 122 34099 470pF 10% 63V
2016
                                                    3112
                                                                                                        2010
                                                                                                               5322 122 32531 100pF 5% 50V
2017
                                                           4822 117 11145 4k7 1% 0,1W
                                                    3113
2018
       4822 124 22652 2.2μF 20% 50V
                                                           4822 117 11953 560Ω 1% 0,1W
                                                    3114
       4822 126 14585 100nF 10% 50V
2019
                                                                                                        -WV-
                                                    3200
                                                           4822 052 11108 1\Omega 5% 0.5W
       4822 122 33127
                       2.2nF 10% 63V
2020
                                                           4822\ 117\ 11373\ \ 100\Omega\ 1\%\ 0805
                                                    3310
       4822 126 14153 2.2nF 10% 1kV
4822 126 14153 2.2nF 10% 1kV
2023
                                                                                                        3002
                                                                                                               4822 117 11927 75Ω 1% 0.1W
                                                    3311
                                                           4822 051 20471 470Ω 5% 0.1W
2024
                                                                                                               4822 117 11927
                                                                                                        3003
                                                                                                                               75Ω 1% 0.1W
                                                    3312
                                                           4822 117 11145 4k7 1% 0,1W
2025
       4822 124 41751 47μF 20% 50V
                                                                                                        3004
                                                                                                               4822 117 11927
                                                                                                                               75Ω 1% 0.1W
                                                           4822 117 11144 3k9 1% 0,1W
                                                    3313
       4822 126 14208 220pF 20% 250V
2030
                                                                                                               4822 051 10102
                                                                                                        3005
                                                                                                                               1k 2% 0.25W
                                                    3314
                                                           4822 117 11448 180Ω 1% 0.1W
       5322 126 10223 4.7nF 10% 63V
2049
                                                                                                        3006
                                                                                                               4822 051 20332
                                                                                                                               3k3 5% 0.1W
                                                    3401
                                                           4822 051 20223 22k 5% 0.1W
       5322 122 32531 100pF 5% 50V
2020 554 90148 470pF 20% 250V
2050
                                                                                                               4822 051 20333 33k 5% 0.1W
4822 117 10833 10k 1% 0.1W
                                                                                                        3007
                                                    3402
                                                           4822 051 20223 22k 5% 0.1W
2051
                                                    3403
                                                           4822 117 10833 10k 1% 0.1W
                                                                                                        3008
       3198 019 54710 470pF 10% 1kV
2052
                                                                                                        3009
                                                                                                               4822 051 10102
                                                                                                                                1k 2% 0.25W
                                                    3999
                                                           4822 050 11002 1k 1% 0.4W
2053
       4822 126 14208 220pF 20% 250V
                                                                                                        3010
                                                                                                               4822 051 20332
                                                                                                                               3k3 5% 0.1W
       4822 126 14208 220pF 20% 250V
2054
                                                                                                        3011
                                                                                                               4822 051 20333
                                                                                                                               33k 5% 0.1W
                        100pF 10% 500V
2101
       4822 122 31211
                                                                                                        3012
                                                                                                               4822 117 10833
                                                                                                                               10k 1% 0.1W
       4822 121 43913 470nF 10% 100V
4822 121 41673 220nF 10% 100V
2102
                                                                                                        3999
                                                                                                               4822 051 20333 33k 5% 0.1W
2103
                                                    5000
                                                           4822 157 53348 Mains filter CU15D3
       4822 126 13682 100pF 5% 1kV
2107
                                                    5002
                                                           4822 526 10704 Bead 45Ω at 50MHz
                                                                                                        ₩
2108
       4822 124 40784
                       3300μF 20% 16V
1000μF 16V
                                                    5003
                                                           3128 138 39401 Transf, CT345D7
       4822 124 81144
2109
                                                    5004
                                                           4822 526 10704 Bead 45Ω at 50MHz
                                                                                                        6001
                                                                                                               9322 149 10685 BZM55-C33
2110
       4822 124 41751
                       47μF 20% 50V
                                                    5005
                                                           4822 157 11411
                                                                           Bead 83Ω at 100MHz
                                                                                                        6002
                                                                                                               9322 149 10685 BZM55-C33
2111
       5322 122 32531 100pF 5% 50V
                                                           3198 018 73380
                                                    5102
                                                                           3.3µH 20%
                                                                                                        6003
                                                                                                               9322 149 10685
                                                                                                                               BZM55-C33
2112
       4822 124 40784 3300μF 20% 16V
                                                    5103
                                                           3198 018 73380 3.3µH 20%
                       1000μF 16V
                                                                                                        6004
                                                                                                               9322 149 10685
                                                                                                                               BZM55-C33
2113
       4822 124 81144
                                                    5104
                                                           3198 018 73380
                                                                           3.3µH 20%
                       220µF 20% 25V
                                                                                                        6005
                                                                                                               9322 149 10685 BZM55-C33
2114
       4822 124 80144
                                                           3128 138 39411
                                                                           Standby transformer
Bead 45Ω at 50MHz
                                                    5200
                                                                                                        6006
                                                                                                               9322 149 10685 BZM55-C33
       4822 124 41751 47μF 20% 50V
                                                           4822 526 10704
                                                    5201
       4822 126 14585 100nF 10% 50V
4822 126 14585 100nF 10% 50V
                                                                                                        6007
                                                                                                               9322 149 10685 BZM55-C33
2116
                                                    5202
                                                           4822 526 10704 Bead 45Ω at 50MHz
                                                                                                        6008
                                                                                                               9322 149 10685 BZM55-C33
2117
                                                           4822 157 11411 Bead 83Ω at 100MHz
                                                    5300
                                                                                                               9322 149 10685 BZM55-C33
       4822 126 14585 100nF 10% 50V
                                                                                                        6009
2118
                                                    5301
                                                           4822 157 11411 Bead 83Ω at 100MHz
                                                                                                        6010
                                                                                                               9322 149 10685 BZM55-C33
2119
       4822 124 22726 4.7µF 20% 35V
                       100nF 10% 50V
2120
       4822 126 14585
       4822 126 14585 100nF 10% 50V
4822 126 14585 100nF 10% 50V
                                                    ₩
2121
2123
                                                    6000
                                                           9322 132 55667 Bridge coil GBU4JL-7002
                        100nF 10% 50V
       4822 126 14585
4822 126 14585
2124
                                                           4822 130 42606 BYD33J
                                                    6002
                        100nF 10% 50V
2126
                                                    6005
                                                           4822 130 31878 1N4003G
                        100pF 10% 500V
2127
       4822 122 31211
                                                    6006
                                                           4822 130 31878 1N4003G
2128
                        100pF 5% 50V
       5322 122 32531
                                                    6007
                                                           4822 130 42488 BYD33D
       4822 126 14585 100nF 10% 50V
2129
                                                    6009
                                                           4822 130 42488 BYD33D
2200
       4822 126 14153 2.2nF 10% 1kV
                                                           4822 130 42606 BYD33J
                                                    6010
2201
       4822 126 14153 2.2nF 10% 1kV
                                                    6011
                                                           4822 130 30621
                                                                           1N4148
2202
       2222 151 90059
                       22µ 20% 400V
                                                           4822 130 30621
       4822 126 14208 220pF 20% 250V
4822 126 14585 100nF 10% 50V
                                                    6012
                                                                           1N4148
2203
                                                    6014
                                                           4822 130 42606 BYD33J
2204
```

6101

6103

6104

1nF 10% 63V

2205

5322 122 31647

5322 122 32531 100pF 5% 50V

4822 130 42606 BYD33.I

4822 130 42606 BYD33J

4822 130 11572 STPS8H100F